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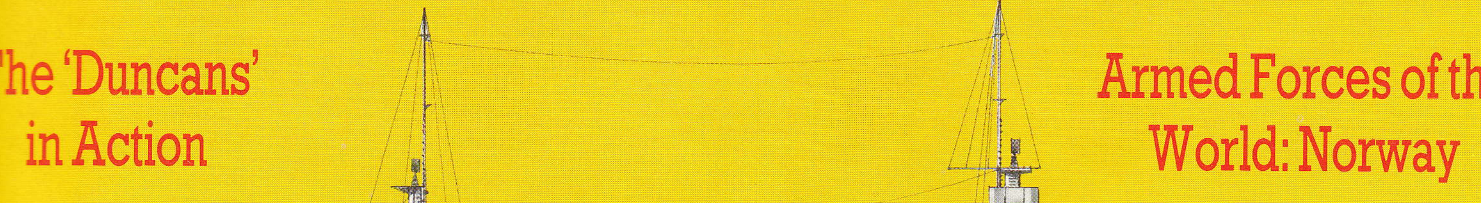

A fully illustrated guide to Pre-Dreadnought Battleships

WAR MACHINE

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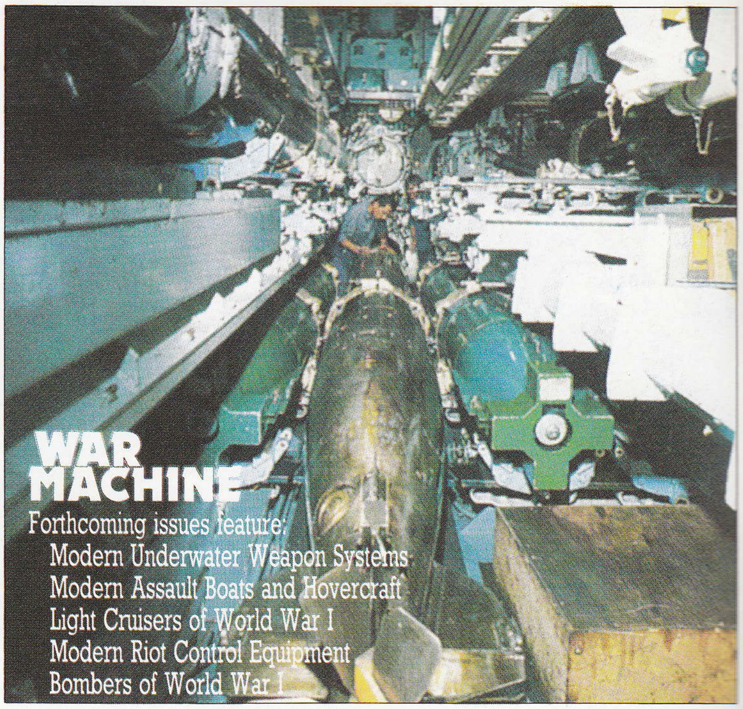

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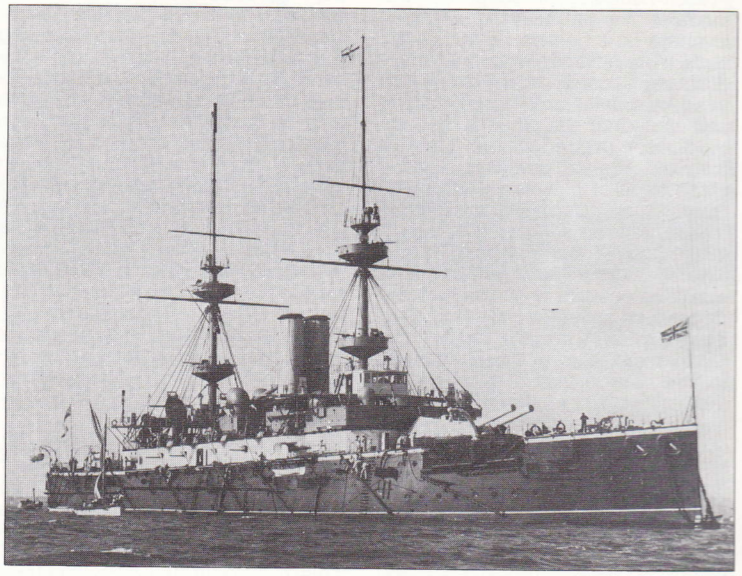
2 PASS

Pre-Dreadnought Battleships

The battleships with which Japan crushed the Russian fleet in 1905 were rendered obsolete just nine months later by the launch of HMS* Dreadnought. *Capital ship design was revolutionized, and earlier battleships became known as 'pre-Dreadnoughts', but despite their inferiority they saw extensive action during World War I.



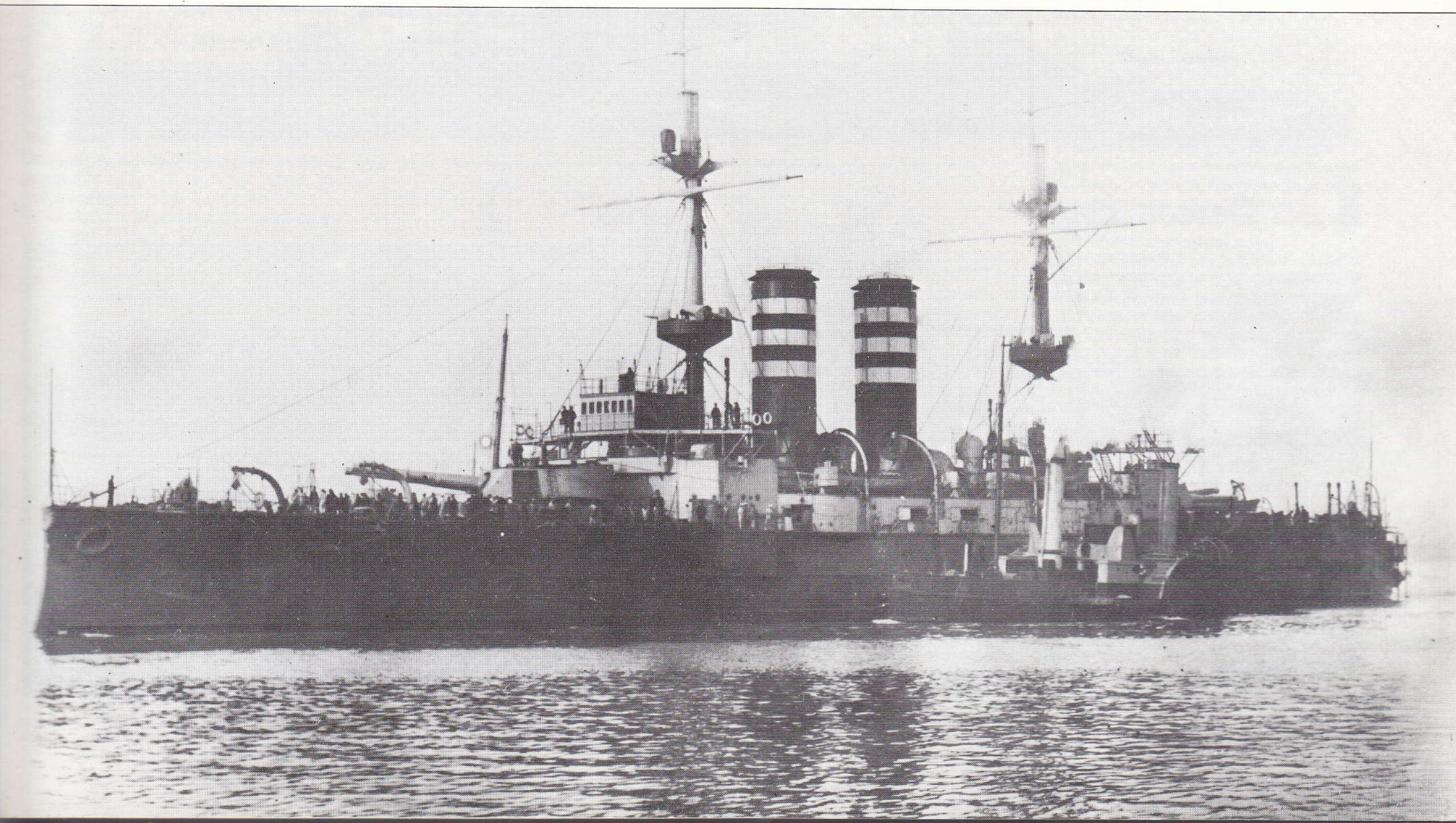
HMS **Majestic** ***was the name ship of the largest class of battleships ever built, and set new standards in warship design when she was launched in January 1895. She was the first of what came to be known after 1905 as 'pre-Dreadnoughts' and was torpedoed and sunk by*** **U-21** ***off Gallipoli in 1915.***

To be 'pre-Dreadnought' in August 1914 was to be obsolete, but to be obsolete was not necessarily to be useless. Smaller, slower and far more lightly armed than 'Dreadnoughts', these ships had to be retained in the battle lines until they could be replaced. This, of course, took time; in the Royal Navy for instance, the famous 'Wobbly Eight' were with Jellicoe's main body until the spring of 1915, but the Germans were obliged to keep them in the first team for much longer, a squadron actually serving at Jutland. At the outbreak of World War I, the newest pre-Dreadnoughts were only recently commissioned (e.g. the British 'Lord Nelsons' in 1908, the German 'Deutschlands' 1906-8 and the French 'Dantons' as late as 1911). They were well-built and some of a transitional nature with 'heavy' and 'semi-heavy' batteries rather than the three-tier armament structures of earlier examples. Thus they furnished a valuable and, in some cases, expendable means of establishing and maintaining sea control away from the main area of the North Sea.

About 50 pre-Dreadnoughts were available to the Royal Navy. Not all were in a condition for prolonged active service, and the oldest became guard/training ships, transports or storeships. Those in the active fleet served worldwide, from South America to North Russia, from the Caribbean to Hong Kong, releasing more modern and useful units for the Grand Fleet. No less than 16 were involved with the Dardanelles operation, five being sunk. They were particularly useful here (as off the Belgian coast) in fire support, but were also found leading expeditions against enemy colonies. In at least one case, a conversion was made for minelaying.

Like their German opposite numbers, responsible for securing the Baltic and its approaches, they had little chance for combat against their peers, so the Russo-Japanese and, to a certain extent, the Spanish-American wars remain the best examples of their operational use.

Mikasa ***was the Japanese flagship at the battle of Tsushima which shattered Russian power in the Pacific and established Japan as a world power. The Japanese navy was trained and heavily influenced by the Royal Navy, and Japanese battleships were built in British yards to British designs. She is preserved today as a museum.***



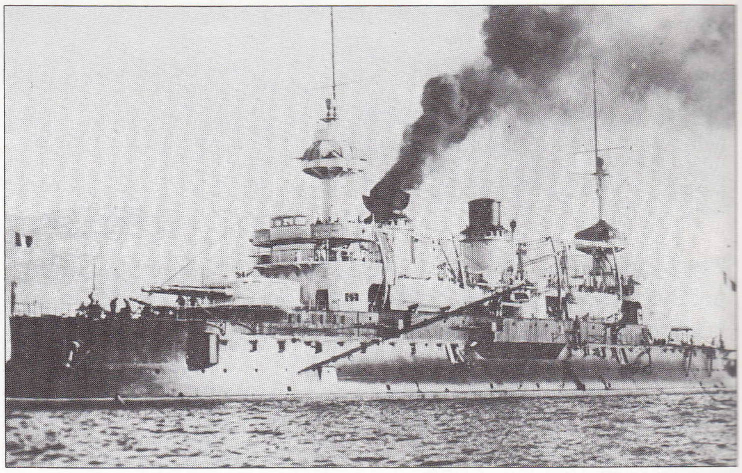
FRANCE

'Charlemagne' class

Contemporary with the later ships of the 'Majestic' class, the three **'Charlemagne' class** units were the first French battleships to adopt the 'two-forward, two-aft' heavy gun layout, favoured for a decade by the British, and a more rational secondary battery down each broadside, the guns separated by splinter-proof screens. Up to and including the *Bouvet* that immediately preceded the 'Charlemagnes', French battleships had a character all of their own, with a single large gun at each end, its muzzles extending to the extremity of the short upper deck to minimize blast effects. From these points both bows and stern extended outward to an exaggerated degree in order to gain sufficient buoyancy and length. Though the 'Charlemagnes' were more moderate in their design they, too, retained a further feature in the pronounced tumblehome that gave the secondary guns a degree of axial fire. Launched in 1895 and 1896, the class comprised the ***Charlemagne, Gaulois*** and ***Saint Louis***.

As was usual in French practice, the main belt was very narrow but ran full length. Between its upper edge and the lower edge of the battery armour the swell of the tumblehome was without protection. At this level was set a protective deck and, one level below, a splinter deck, the space between being closely sub-divided ('cellular') to contain flooding following damage. It is doubtful if this cellular layer was of sufficient depth to avoid being submerged by significant water ingress, and thus allowing progressive flooding.

By 1914 the class was of low combat value (like the 'Majestics' the ships just predated the pre-Dreadnoughts) but were nevertheless useful in low-risk areas. On 18 March 1915, the *Charlemagne* and *Gaulois* were operating with the *Bouvet* and *Suffren* as a bombardment group under Admiral Guépratte at the Dardanelles in the battle with the forts. The *Gaulois* had been heavily damaged forward and was having to withdraw, when the *Bouvet* was mined. Her magazines went and she disappeared in less than three minutes. On this day the British HMS Irresistible and *Ocean* were also destroyed, effectively signalling the end of serious attempts to force the strait. The *Gaulois* had to be grounded and, though later refloated and repaired at Toulon, was sunk by submarine torpedo.



Pictured here in 1900, Gaulois *was obsolete as a battleship by World War I but accompanied* Charlemagne *to the Dardanelles as part of the Anglo-French fleet which failed to force the straits.* Gaulois *was badly mauled by Turkish shore batteries on 18 March 1915 and had to withdraw. She was repaired only to be sunk by* UB-47 *in 1916.*

Specification

'Charlemagne' class

Displacement: 11,300 tons full load

Dimensions: length 118.0 m (387.1 ft); beam 20.5 m (67.25 ft); draught 8.4 m (27.6 ft)

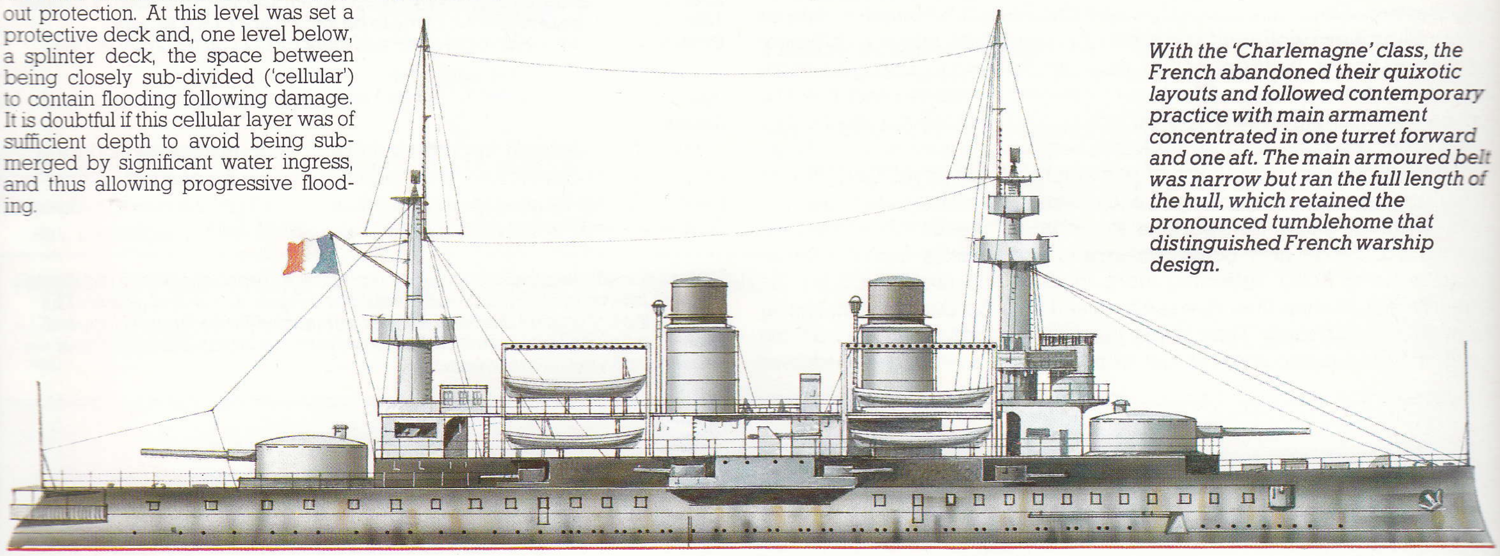
Propulsion: three sets of triple-expansion steam engines delivering 10810 kW (14,500 ihp) to three shafts

Speed: 18 kts

Armament: two twin 305-mm (12-in), 10 136.8-mm (5.4-in) and eight 100-mm (3.94-in) guns, and two 450-mm (17.7-in) torpedo tubes

Protection: belt 400 mm (15.75 in) tapering to 250 mm (9.84 in); decks 90 and 40 mm (3.54 and 1.57 in); barbettes 400 mm (15.75 in) maximum; casemates 75 mm (2.95 in)

Complement: 725



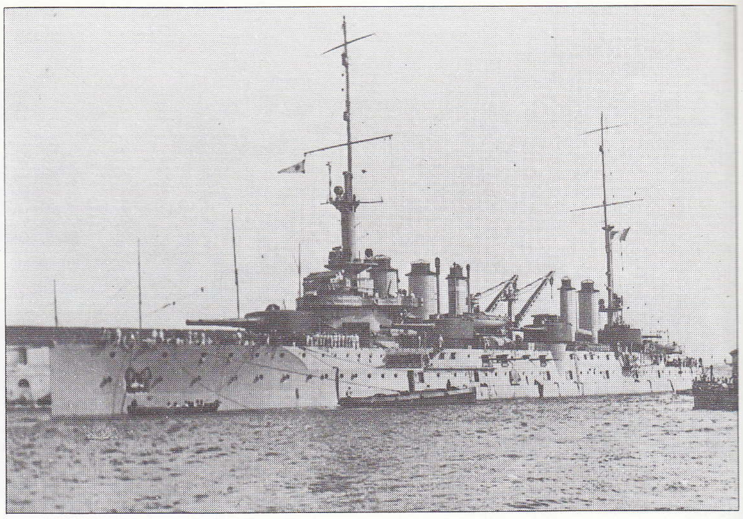
With the 'Charlemagne' class, the French abandoned their quixotic layouts and followed contemporary practice with main armament concentrated in one turret forward and one aft. The main armoured belt was narrow but ran the full length of the hull, which retained the pronounced tumblehome that distinguished French warship design.

FRANCE

'Danton' class

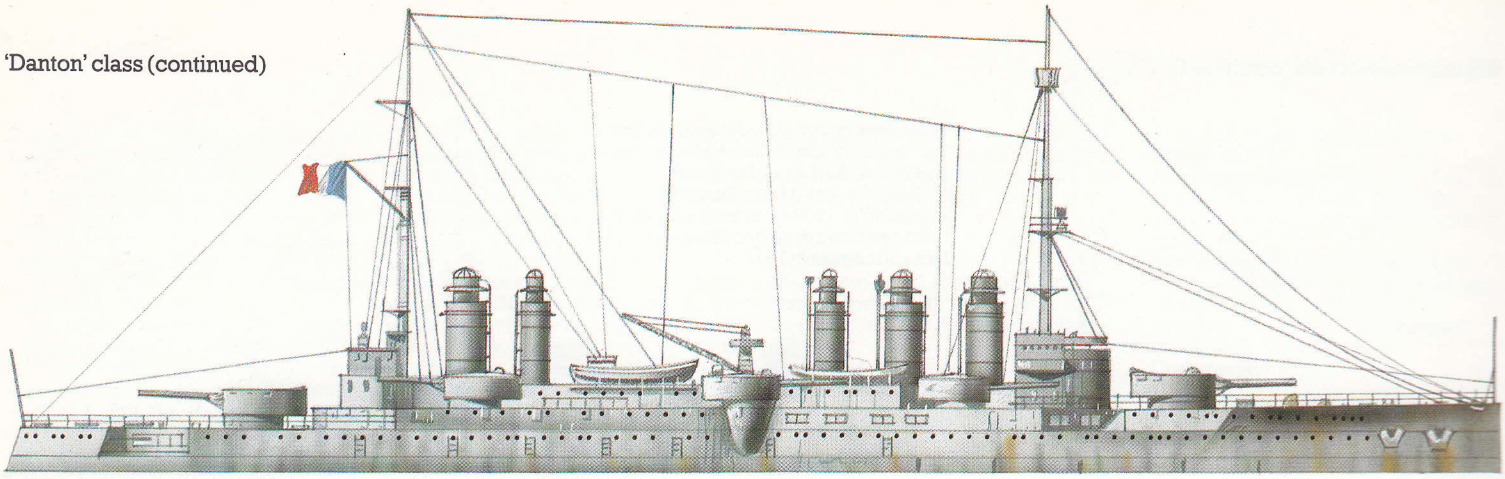
Even in 1907 the possibility of war with Germany occupied the mind of the French services and, though loth to divert money from their army, they proposed a naval building programme that would have resulted in a force of 38 battleships, 20 armoured cruisers, 279 destroyers and torpedo boats, and 131 submarines by 1920. The first class of battleship constructed to implement this grandiose (and never realized) plan were the six **'Danton' class** units of the 1905 programme. The nameship was laid down in 1906, only nine months after the British 'Lord Nelsons' and, though they had little in common with the latter, there was a fundamental similarity in that the secondary battery was increased in calibre, rationalized to a single type and fully turreted. Being both beamier and longer, the French ships managed to accommodate three twin secondary turrets per side, but apart from this the armaments were very similar and, like the British ships, the class represented an intermediate step to the Dreadnought type then just being introduced. Where the 'Lord Nelsons' were wisely terminated at only one pair, however, the French stuck stubbornly to their programme for six hulls, all of which were completed in 1911, when other fleets were building Dreadnoughts. The ships were the ***Condorcet, Danton, Diderot, Mirabeau, Verguiaud*** and ***Voltaire***.

The 'Dantons' were, however, the first French turbine-driven class, with



Seen here at Toulon, Voltaire *demonstrated the soundness of the 'Dantons'' extensive subdivision when she took and survived two torpedoes from the German submarine* UB-48. Danton *herself was not so lucky, succumbing to a single hit from* U-64 *in 1917.*

'Danton' class (continued)



French naval policy in the 1900s was muddled, wasteful and short-sighted. The 'Danton' class was rendered obsolete by HMS* Dreadnought. *Whereas the British only built two 'Lord Nelsons', the French obstinately built six 'Dantons'.

Parsons-built units turning four shafts with a near 30 per cent increase in power compared with the 'Verité' class that preceded them. Their 26 coal-fired boilers exhausted by an impressive five funnels batched, in typically French fashion, in two groups.

While not as extreme in design as earlier French battleships, the 'Dantons' perpetuated the shallow main belt, backed by a large degree of subdivision. This stood the *Danton* herself in good stead when, in 1917, she was heavily damaged by two well-spaced torpedoes from the *U-64*. She eventually succumbed to progressive flooding but gave her crew plenty of time for evacuation. The *Condorcet, Diderot* and *Voltaire* enjoyed long lives, the two latter being scrapped in the late 1930s and the *Condorcet* actually being scuttled in Toulon by the retreating Germans in 1944.

Specification
'Danton' class
Displacement: 18,320 tons standard and 19,760 tons full load
Dimensions: length 146.6 m (481.0 ft); beam 25.8 m (84.6 ft); draught 8.7 m (28.5 ft)
Propulsion: four sets of direct-drive steam turbines delivering 16775 kW (22,500 shp) to four shafts
Speed: 19 kts
Armament: two twin 305-mm (12-in), six twin 240-mm (9.4-in) and 16 75-mm (2.95-in) guns, and two 450-mm (17.7-in) torpedo tubes
Protection: belt 255-200 mm (10-8 in); decks 75 mm (2.95 in); barbettes 280 mm (11 in); secondary turrets 225 mm (8.85 in)
Complement: 920

ITALY

'Vittorio Emanuele III' class

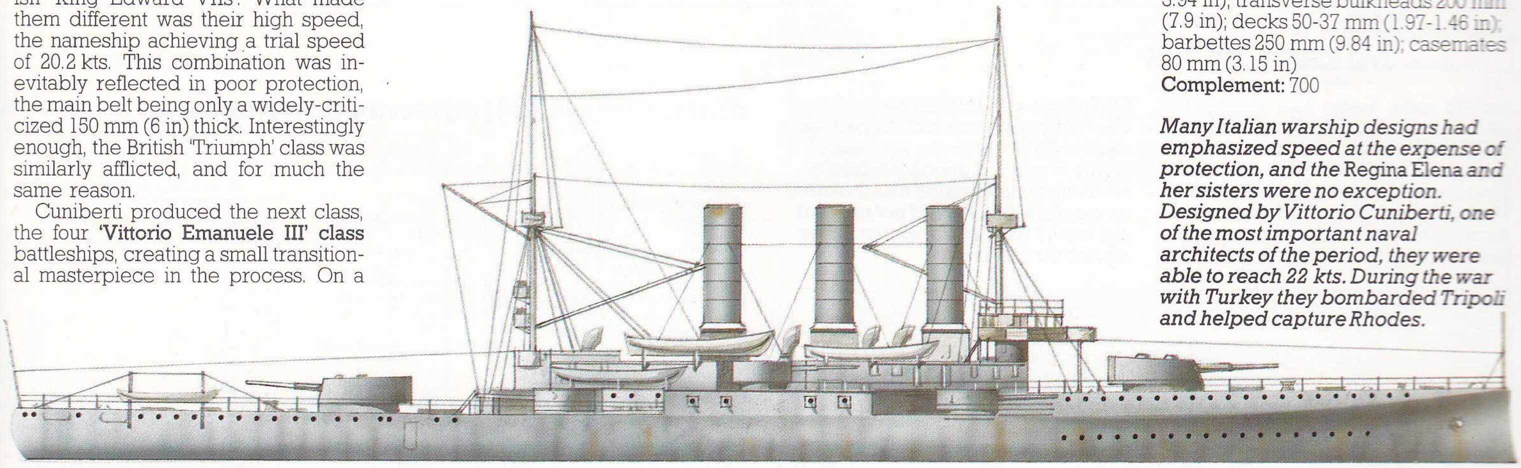
The 'speed is protection' concept has always been a major influence in Italian design, resulting in many highly original warships. In addition the Italians possessed, in Vittorio Cuniberti, the single most influential figure in the movement toward the all-big gun capital ship.

At the turn of the century the Italians' chief designer, Benedetto Brin, produced the two 'Regina Margheritas' which, on a 13,200-ton displacement, shipped a conventional armament mix of four 305-mm (12-in), four 203-mm (8-in) and 12 152-mm (6-in) guns, roughly comparable to the contemporary British 'King Edward VIIs'. What made them different was their high speed, the nameship achieving a trial speed of 20.2 kts. This combination was inevitably reflected in poor protection, the main belt being only a widely-criticized 150 mm (6 in) thick. Interestingly enough, the British 'Triumph' class was similarly afflicted, and for much the same reason.

Cuniberti produced the next class, the four **'Vittorio Emanuele III' class** battleships, creating a small transitional masterpiece in the process. On a marginally smaller displacement than Brin's ships, they were some 3 m (9.8 ft) longer but 1.5 m (4.9 ft) narrower, the resulting fine hull achieving 22 kts on the same power. A two-tier main and secondary battery was favoured, anticipating the British 'Lord Nelsons'. Its great drawback lay in having to accept only two 305-mm (12-in) guns, in single mountings forward and aft; such weak main battery was insufficient for developing a sustained and accurate fire at any range. This penalty was the result of Cuniberti's success in working-in a full-length belt, with 250 mm (9.84 in) of steel over the parts that mattered. Launched beteen 1904 and 1907, the ships were the ***Napoli, Regina Elena, Roma*** and ***Vittorio Emanuele III***.

The Italians, in effect, had built something like a small battle-cruiser ahead of its time. Its immediate influence was with the Japanese, whose recent battle experience had demonstrated the uses of a fast armoured cruiser. As a result they produced the two 'Ibukis' of 1907, slightly longer than the Italian ships and with protection reduced to accommodate a four-gun main battery.

Specification
'Vittorio Emanuele III' class
Displacement: 12,750 tons standard and 14,050 tons full load
Dimensions: length 144.6 m (474.4 ft); beam 22.4 m (73.5 ft); draught 8.3 m (27.2 ft)
Propulsion: two sets of triple-expansion steam engines delivering 14540 kW (19,500 ihp) to two shafts
Speed: 22 kts
Armament: two 305-mm (12-in), six twin 203-mm (8-in) and 12 76-mm (3-in) guns, and two 450-mm (17.7-in) torpedo tubes
Protection: belt 250-100 mm (9.84-3.94 in); transverse bulkheads 200 mm (7.9 in); decks 50-37 mm (1.97-1.46 in); barbettes 250 mm (9.84 in); casemates 80 mm (3.15 in)
Complement: 700



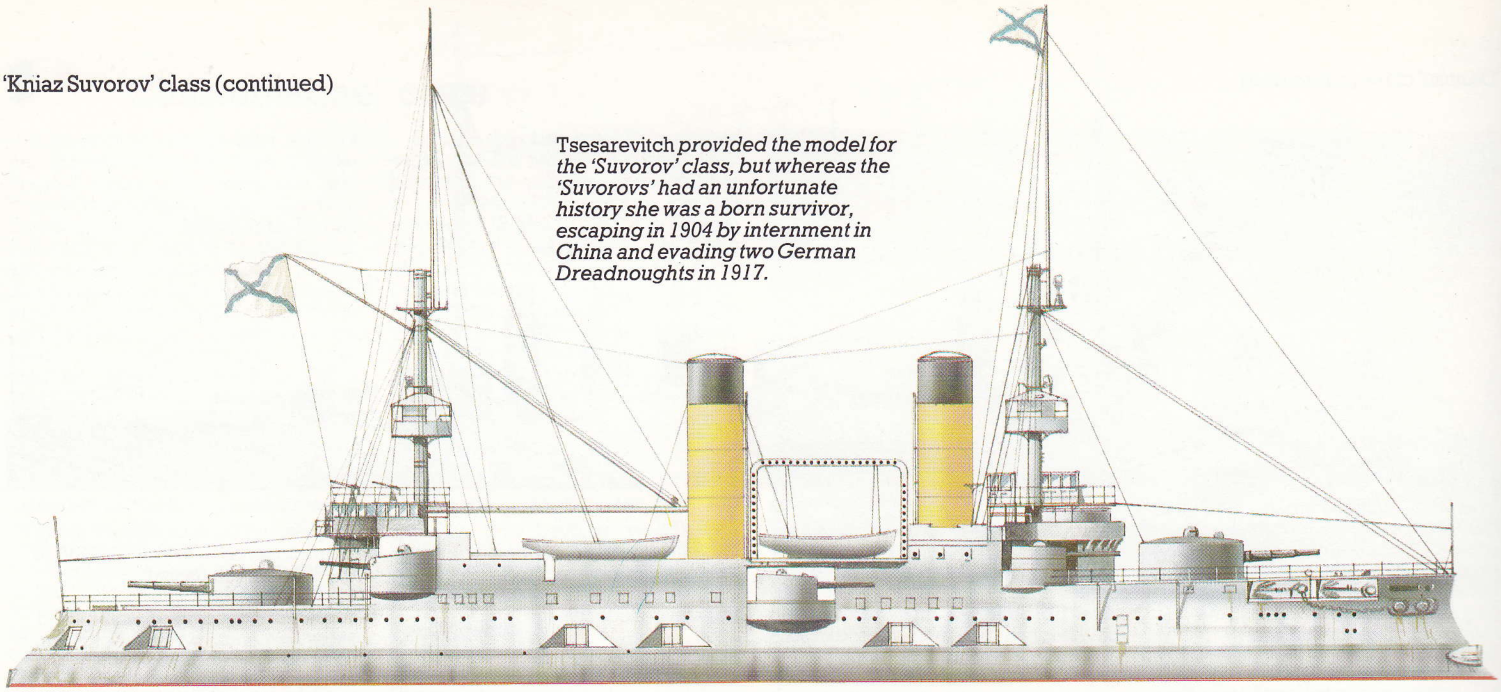
Many Italian warship designs had emphasized speed at the expense of protection, and the* Regina Elena *and her sisters were no exception. Designed by Vittorio Cuniberti, one of the most important naval architects of the period, they were able to reach 22 kts. During the war with Turkey they bombarded Tripoli and helped capture Rhodes.

RUSSIA

'Kniaz Suvorov' class

The five **'Kniaz Suvorov' class** battleships represented a great advance over the rather larger trio of 'Osliabyas' that had only recently stemmed from Russian yards. They owed their improvement primarily to the acquisition of the one-off French-built *Tsesarevitch*, the first real Russian pre-Dreadnought, which provided the model. Armament was sensibly laid out, the twin 305-mm (12-in) turrets well spread and the 12 152-mm (6-in) guns twinned in three turrets per side. Compared with earlier Russian designs, the ships were shorter, beamier and far better subdivided though, in keeping with the usual French practice, they had a full-length belt that was very shallow and backed with a cellular level. The amidships 152-mm (6-in) turrets were sponsoned to allow eight 152-mm (6-in) guns to fire axially either forwards or astern. Launched between 1901 and 1903, the ships were the ***Borodino, Imperator Alexander III, Kniaz Suvorov, Orel*** and ***Slava***.

They had the most disastrous history of any class. Representing a considerable investment, four of them sailed as Rozhdestvensky's First Division on the long trek to Tsushima, the *Slava* being unready for the voyage. On paper they stood a very good chance against anything that the Japanese could muster. That they were so badly defeated in spite of giving a good account of them-

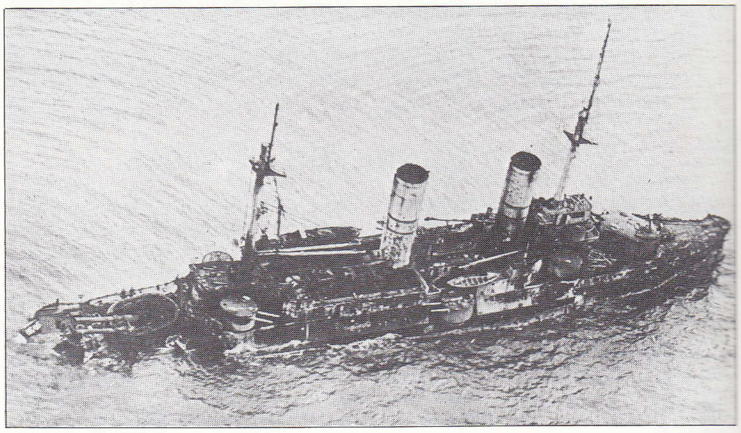


Tsesarevitch *provided the model for the 'Suvorov' class, but whereas the 'Suvorovs' had an unfortunate history she was a born survivor, escaping in 1904 by internment in China and evading two German Dreadnoughts in 1917.*

selves was due to several reasons. Long out of dock, they were slowed on the fateful day not only by their own condition but by slower ships in the combined fleet, thus easily being outmanoeuvred. At the battle they were still grossly overloaded with coal, problems with bunkering supplies enforcing the stowage of vast quantities on the upper decks; not only did this reduce metacentric height to a point where they rolled heavily and with an ominous deliberation, but also increased draught to the point where the main belt was all but immersed and the casemated 76-mm (3-in) battery was too close to the sea to be worked properly. The *Kniaz Suvorov* sank after five hours, having taken four torpedoes; while her belt was not pierced, severe impacts caused heavy leaks in the belt's supporting structure. Both the *Imperator Alexander III* and the *Borodino* surived a similar period, succumbing finally to both fire and explosion. The *Orel*, damaged only topsides, surrendered and was taken into the Japanese fleet as the ***Iwami***, being expended as an aircraft target in 1924. The *Slava* was sunk in 1917.

Specification

'Kniaz Suvorov' class
Displacement: 13,520 tons standard
Dimensions: length 112.0 m (367.5 ft); beam 23.15 m (76.0 ft); draught 8.0 m (26.2 ft)
Propulsion: two sets of triple-expansion steam engines delivering 11930 kW (16,000 ihp) to two shafts
Speed: 18 kts
Armament: two twin 305-mm (12-in), 12 152-mm (6-in) and 20 76-mm (3-in) guns, and six 457-mm (18-in) torpedo tubes
Protection: belt 229-102 mm (9-4 in); transverse bulkheads 229 mm (9 in); protective decks 64-38 mm (2.5-1.5 in); barbettes 254 mm (10 in) maximum; casemates 152 mm (6 in)
Complement: 775



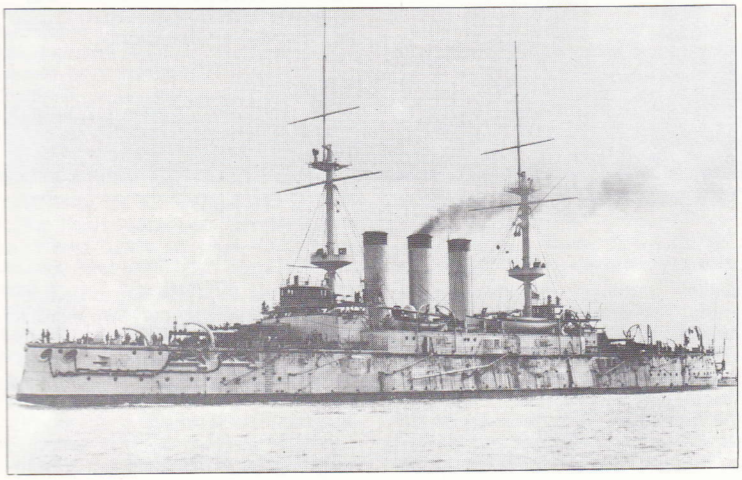
Slava *was completed too late for the debacle at Tsushima, and served with the Baltic fleet in World War I. Here she lies after encountering the German Dreadnought* König *in the Gulf of Riga; too badly damaged to make port, she was scuttled in the Moon Sound, blocking one entrance.*

JAPAN

'Mikasa' class

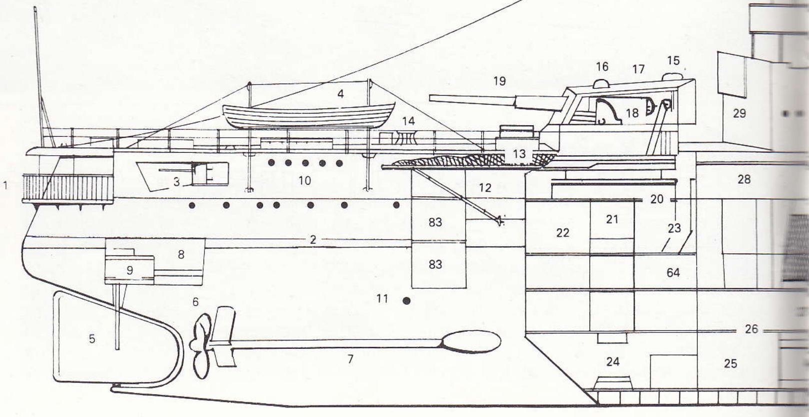
Japan's main battle line during the 1904-5 war with Russia was British-built, and Tsushima was the only major engagement when British-origin pre-Dreadnoughts were fully battle-tested. Though completed with Japanese features, these capital ships were heavily based on contemporary Royal Naval

Shikishima ***was the first battleship of the 1896 programme, designed and built in Britain with the 'Majestics' firmly in mind. A goodly amount of watertight subdivision was included in the class, but this did not prevent the loss of*** **Hatsuse** ***to Russian mines off Port Arthur in 1904.***



Shikishima (1904) cutaway drawing key

1 Sternwalk
2 Waterline
3 3-in 12-pdr QF
4 Cutter
5 Balanced rudder
6 Screw
7 Shaft
8 Steering compartment
9 Steering engine
10 Captain's quarters
11 Aft 18-in torpedo tube
12 Anti-torpedo net boom
13 Anti-torpedo net folded on shelf
14 Capstan
15 Main sighting hood
16 Gunlayer's sighting hood
17 Turret
18 Breech
19 12-in 40-cal gun
20 Turntable
21 Ammunition hoist to 12-in guns
22 Working chamber
23 Access tube to working chamber
24 12-in shell room
25 12-in gun powder room
26 Lower edge of 9-in Harvey nickel steel armoured belt
27 6-in gun magazine
28 Officers' quarters
29 Blast screen
30 Aft bridge



practice, being closely related to the 'Royal Sovereigns' (*Fuji* and *Yashima*), the 'Formidables' (*Shikishima, Hatsuse* and ***Mikasa***, and also *Asahi*) and the 'King Edward VIIs' (*Kashima* and *Katori*). The last pair still being under construction, the *Mikasa* as the newest took Admiral Togo's flag and became associated with him.

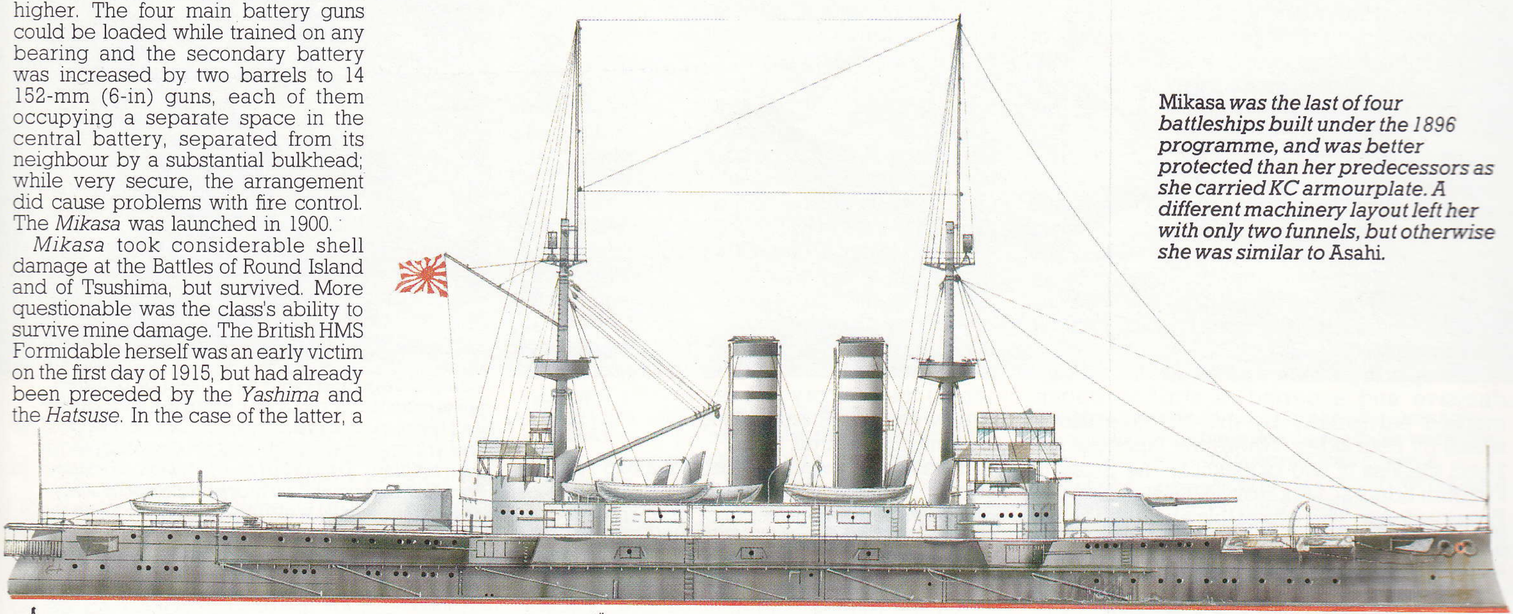
As often happened, the design marked a qualified improvement on the Royal Navy version. The protection was of the same order but differently disposed, and the speed was a little higher. The four main battery guns could be loaded while trained on any bearing and the secondary battery was increased by two barrels to 14 152-mm (6-in) guns, each of them occupying a separate space in the central battery, separated from its neighbour by a substantial bulkhead; while very secure, the arrangement did cause problems with fire control. The *Mikasa* was launched in 1900.

Mikasa took considerable shell damage at the Battles of Round Island and of Tsushima, but survived. More questionable was the class's ability to survive mine damage. The British HMS Formidable herself was an early victim on the first day of 1915, but had already been preceded by the *Yashima* and the *Hatsuse*. In the case of the latter, a first mine explosion disabled the ship, which drifted onto a second, whose explosion detonated a magazine.

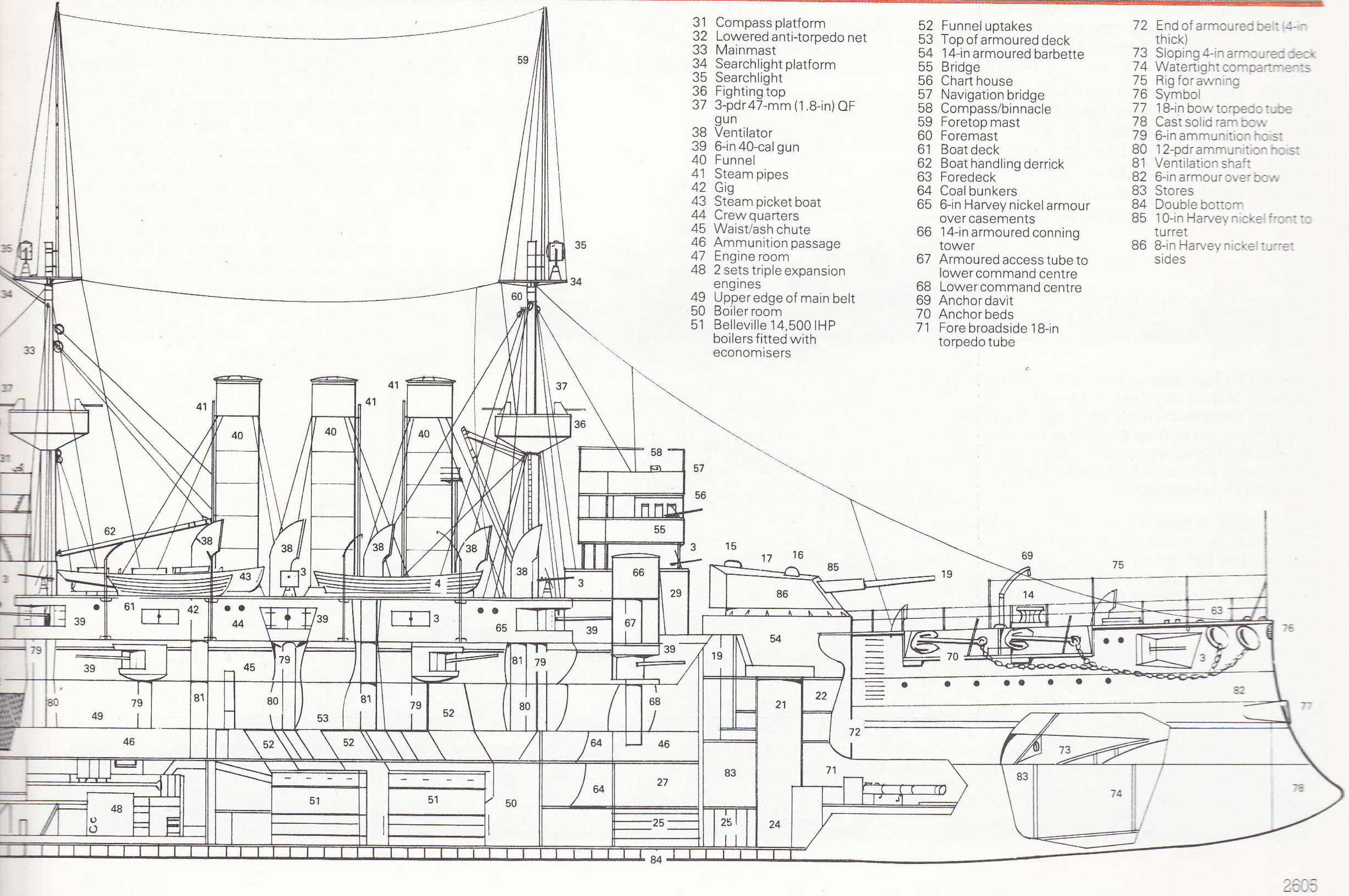
Having survived the thick of the war, the *Mikasa* was sunk in Sasebo by an internal explosion. Raised and repaired, she re-entered service in 1908, though plans to uprate her armament were not fulfilled, probably due to the imminent delivery of Japan's two first home-built all-big-gun ships (*Satsuma* and *Aki*). She escaped the Washington Treaty axe by being re-rated a coast defence ship and, in October 1926, was opened as an official naval memorial. Despite a second world war, she remains as such to this day.

Specification
Mikasa

Displacement: 12,500 tons standard
Dimensions: length 128.3 m (421.0 ft); beam 23.2 m (76.0 ft); draught 8.3 m (27.25 ft)
Propulsion: two sets of triple-expansion steam engines delivering 11185 kW (15,000 ihp) to two shafts
Speed: 18.5 kts
Armament: two twin 305-mm (12-in), 14 152-mm (6-in) and 20 76-mm (3-in) guns, and four 457-mm (18-in) torpedo tubes
Protection: belt 229-104 mm (9-4 in); transverse bulkheads 305 mm (12 in); protective deck 76 mm (3 in); barbettes 356 mm (14 in) maximum; casemates 152 mm (6 in)
Complement: 935



***Mikasa** was the last of four battleships built under the 1896 programme, and was better protected than her predecessors as she carried KC armourplate. A different machinery layout left her with only two funnels, but otherwise she was similar to **Asahi**.*



31 Compass platform
32 Lowered anti-torpedo net
33 Mainmast
34 Searchlight platform
35 Searchlight
36 Fighting top
37 3-pdr 47-mm (1.8-in) QF gun
38 Ventilator
39 6-in 40-cal gun
40 Funnel
41 Steam pipes
42 Gig
43 Steam picket boat
44 Crew quarters
45 Waist/ash chute
46 Ammunition passage
47 Engine room
48 2 sets triple expansion engines
49 Upper edge of main belt
50 Boiler room
51 Belleville 14,500 IHP boilers fitted with economisers
52 Funnel uptakes
53 Top of armoured deck
54 14-in armoured barbette
55 Bridge
56 Chart house
57 Navigation bridge
58 Compass/binnacle
59 Foretop mast
60 Foremast
61 Boat deck
62 Boat handling derrick
63 Foredeck
64 Coal bunkers
65 6-in Harvey nickel armour over casements
66 14-in armoured conning tower
67 Armoured access tube to lower command centre
68 Lower command centre
69 Anchor davit
70 Anchor beds
71 Fore broadside 18-in torpedo tube
72 End of armoured belt (4-in thick)
73 Sloping 4-in armoured deck
74 Watertight compartments
75 Rig for awning
76 Symbol
77 18-in bow torpedo tube
78 Cast solid ram bow
79 6-in ammunition hoist
80 12-pdr ammunition hoist
81 Ventilation shaft
82 6-in armour over bow
83 Stores
84 Double bottom
85 10-in Harvey nickel front to turret
86 8-in Harvey nickel turret sides

'Let every man do his utmost'

The battle of Tsushima was the most overwhelming naval victory since Trafalgar and it set the seal on the Japanese triumph over Russia in the war of 1904-5. Having defeated the Russian Pacific fleet based at Port Arthur, the Japanese navy annihilated a second Russian force which had steamed all the way from the Baltic. Japan established herself as a world power, and the scale of the defeat plunged the Tsarist Empire into crisis.

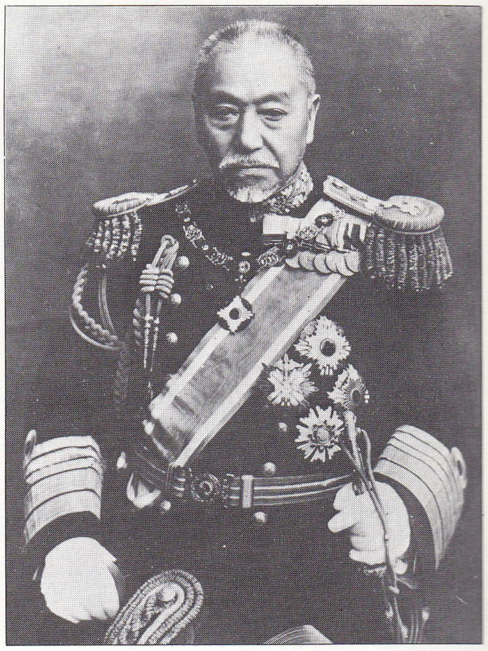
In the early years of the 20th century Tsarist Russia was expanding her Far Eastern interests in total disregard of a Japan that was still struggling with the internal problems associated with her rapid change from a medieval to a modern society. Her protests and efforts at compromise having utterly failed, Japan suddenly broke off diplomatic relations in February 1904 and, without formal declaration, fell two days later on the Russian Port Arthur squadron as it slumbered at its moorings. The Russo-Japanese War had begun.

At the outbreak of war the Russians' full Pacific Fleet was comparable in size to that of the Japanese but, where the latter had the edge in efficiency and organization they could ill afford to lose any ships, for, whereas the Russians could replace losses from elsewhere, the Japanese could not.

The opening attack on Port Arthur was not decisive and a period of attrition began, marked particularly by the effective use of mines by both sides. Where the Japanese suffered the loss of two battleships, the Russians lost their admiral, Makarov, in the sinking of the *Petropavlovsk*. The loss of this able leader and the increasing aggressiveness of the Japanese at sea gradually demoralized the Russian squadron, which was virtually trapped in Port Arthur, itself now under siege by land.

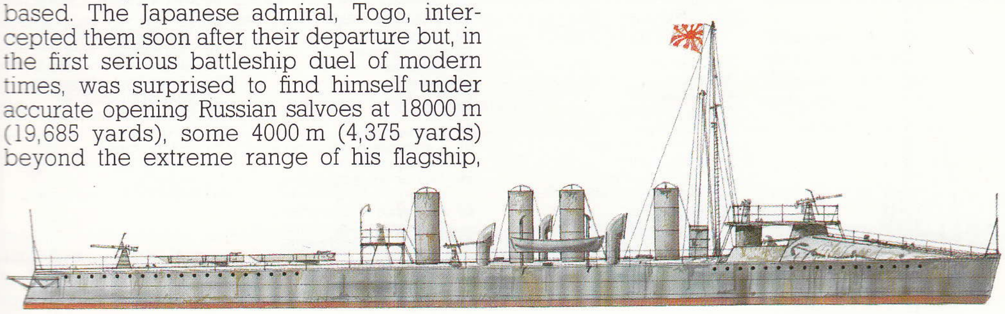
In August 1904, by the decree of the Tsar himself, the force broke out for the safety of Vladivostok, where a second squadron was based. The Japanese admiral, Togo, intercepted them soon after their departure but, in the first serious battleship duel of modern times, was surprised to find himself under accurate opening Russian salvoes at 18000 m (19,685 yards), some 4000 m (4,375 yards) beyond the extreme range of his flagship, *Mikasa*. After several hours of indecisive manoeuvring, during which *Mikasa* suffered 305-mm (12-in) hits from 13000 m (14,215 yards), the Russian flagship *Tsesarevitch* was hit twice. Though not particularly damaging to the ship, these hits killed the admiral, Vitgeft, and jammed the helm. Temporarily lacking both brain and rudder, the ship circled out of control. With no information as to what was happening, the remainder of the squadron also broke line. Togo seized his chance and succeeded in virtually surrounding his demoralized enemy but then, instead of pressing home the attack he allowed the majority to escape back to the false security of Port Arthur. Cruisers had played no part in the action proper, while the Japanese preponderance in medium-calibre guns had been of no use whatsoever. This, the Battle of the Yellow Sea, had proved the supremacy of the big gun. The failure of the Japanese to exploit their victory was repeated a few days later when the Russian Vladivostok squadron was intercepted off Ulsan.

It was now August 1904 and the two Russian Pacific squadrons had been separately chastened. As early as June, their government had announced that the bulk of the Baltic Fleet would be despatched to their assistance, but it was not until the October that they finally sailed under the ruthless and abusive Vice-Admiral Rozhdestvensky. On paper the eight battleships, seven cruisers, nine destroyers and a mass of auxiliaries looked formidable, but they were of variable quality and their crews poorly trained. Ahead lay a voyage of 29000 km (18,000 miles): at its end waited an eager enemy of proven competence.

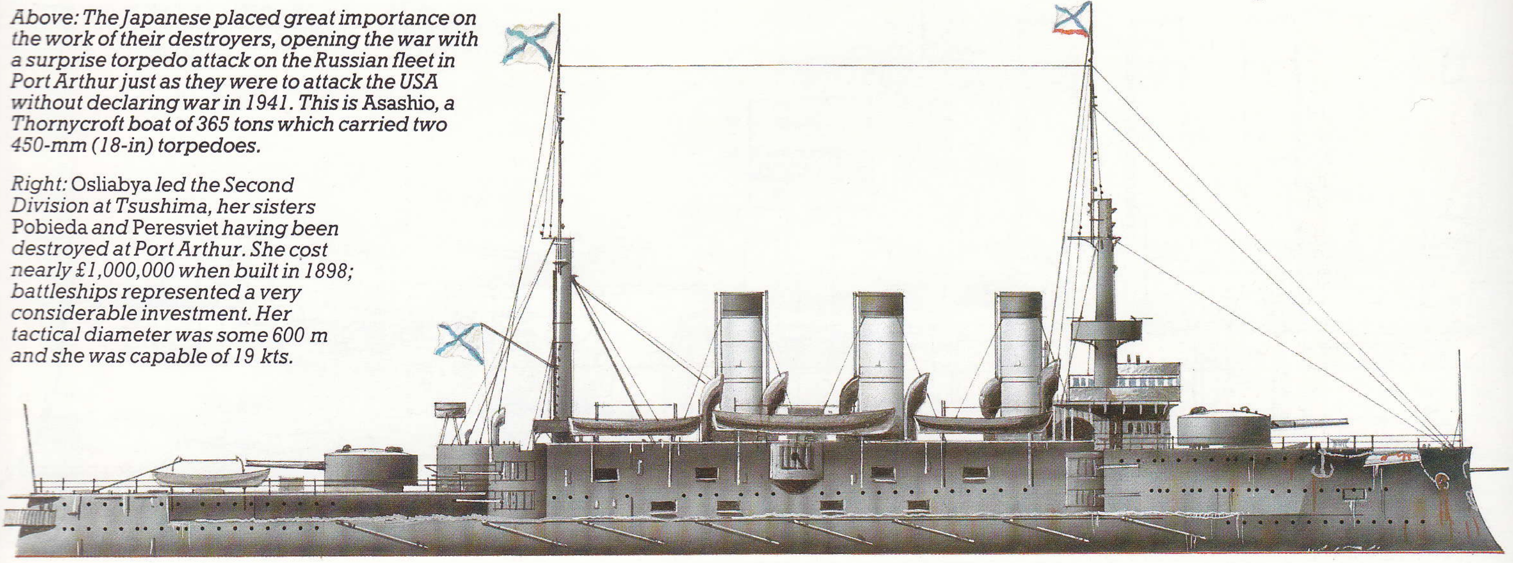


Admiral Togo had been described by brother officers as 'a silly old fool' before the war, but he had the measure of his enemies both in Port Arthur and at Tsushima. Steady and professional rather than brilliant, Togo kept the Russians blockaded in Port Arthur as much by moral superiority as by physical power.

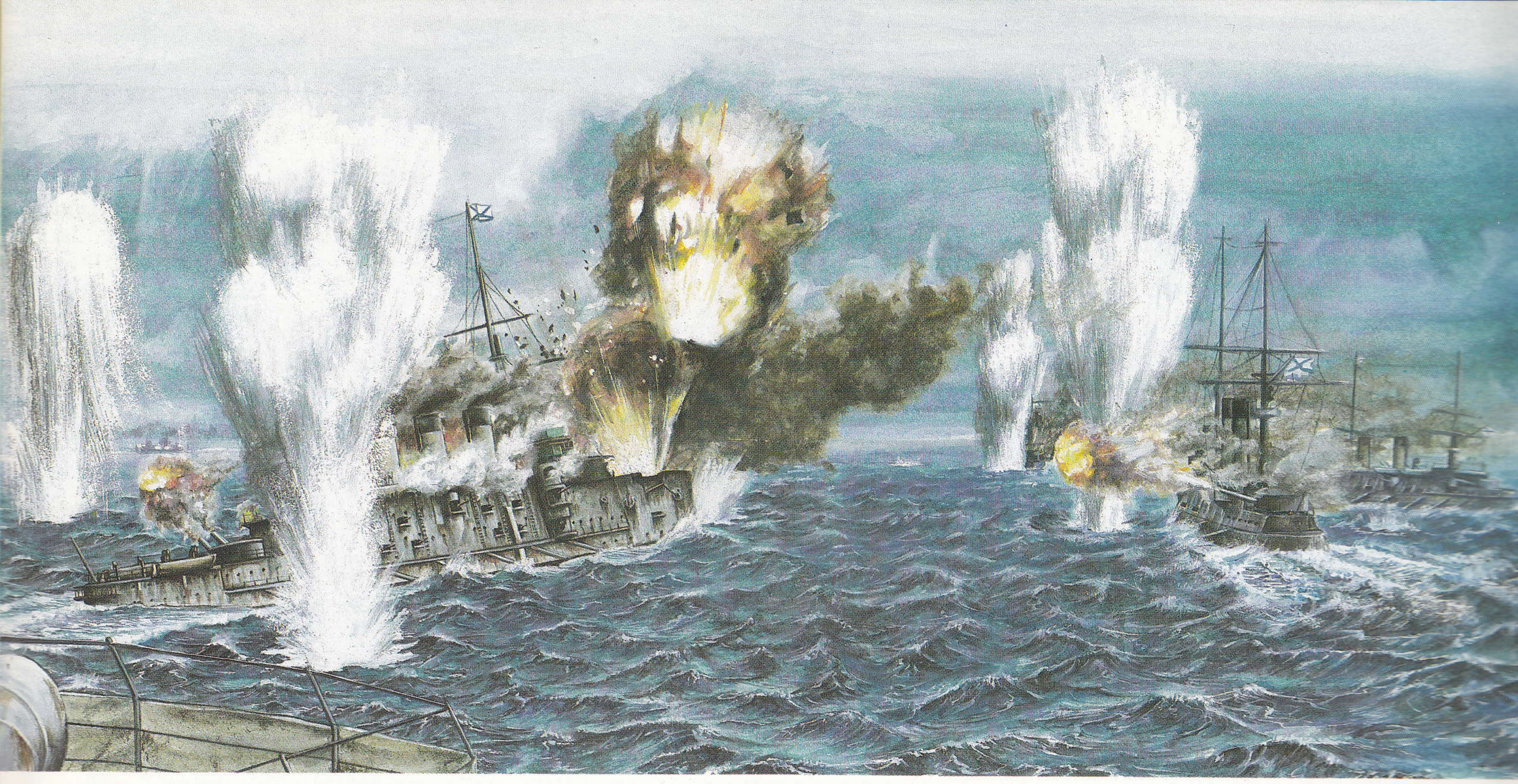
On the 99th anniversary of the Battle of Trafalgar, the armada nearly went to war with the British in the North Sea. Seeing Japanese torpedo boats in every shift of mist they fired heavily on fishing craft off Hull, sinking one. With the British government deliberating direct action, the humiliated Rozhdestvensky was escorted by the Royal Navy as far as Gibraltar. The incident was to have far-reaching consequences in giving the Russians bunkering problems throughout their voyage. By the new year, 1905, they had rounded Africa and reached Madagascar, where they received the crushing news of the fall of Port Arthur and the loss of its squadron, it would now have to be Vladivostok or nothing.



Above: *The Japanese placed great importance on the work of their destroyers, opening the war with a surprise torpedo attack on the Russian fleet in Port Arthur just as they were to attack the USA without declaring war in 1941. This is* Asashio*, a Thornycroft boat of 365 tons which carried two 450-mm (18-in) torpedoes.*



Right: Osliabya *led the Second Division at Tsushima, her sisters* Pobieda *and* Peresviet *having been destroyed at Port Arthur. She cost nearly £1,000,000 when built in 1898; battleships represented a very considerable investment. Her tactical diameter was some 600 m and she was capable of 19 kts.*

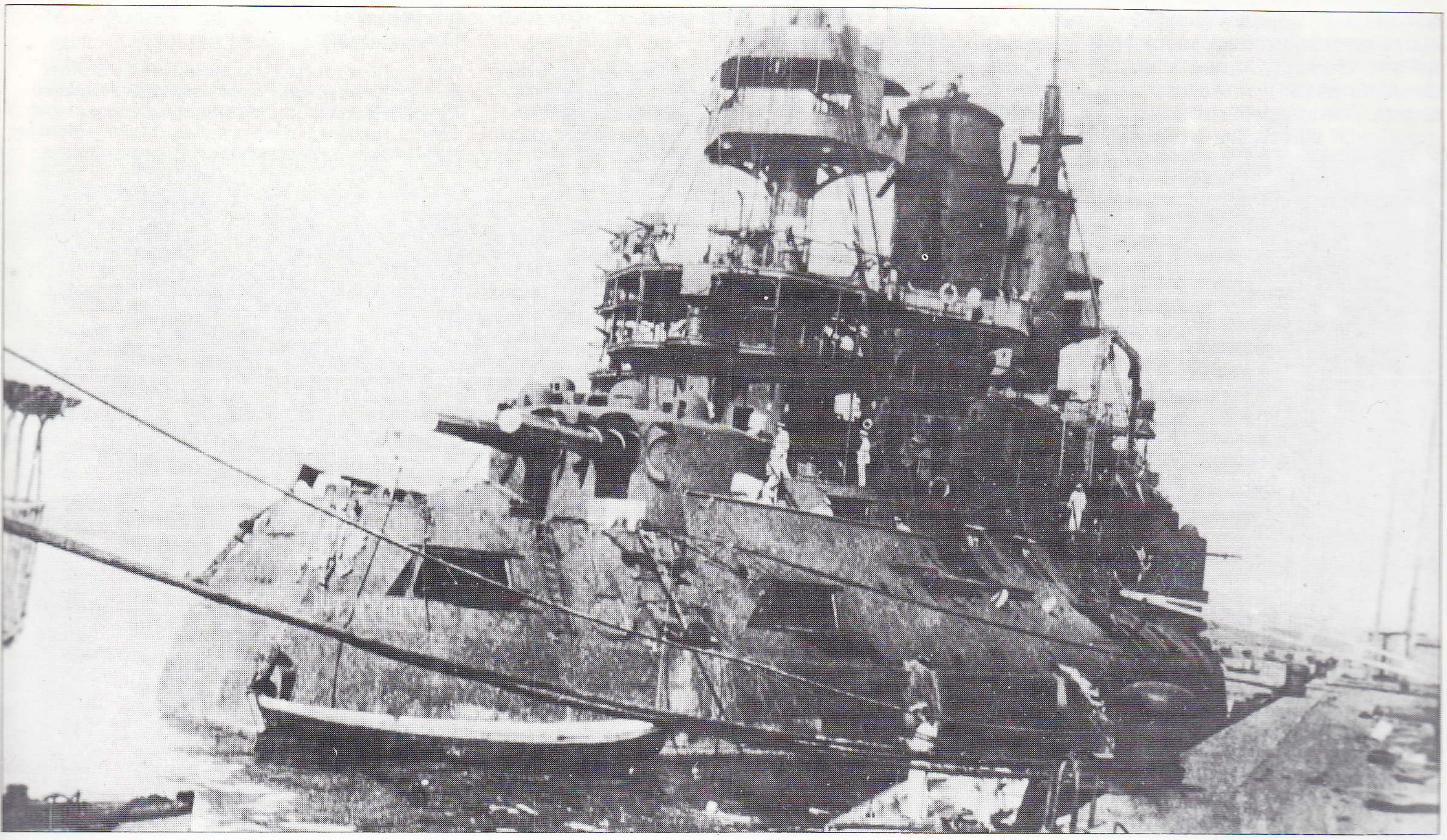


Osliabya *reels under a hail of shellfire, her main armoured belt submerged beneath the waterline because of the weight of extra coal she was carrying. To starboard,* Kniaz Suvorov, *the flagship, is on fire and the Admiral wounded.*

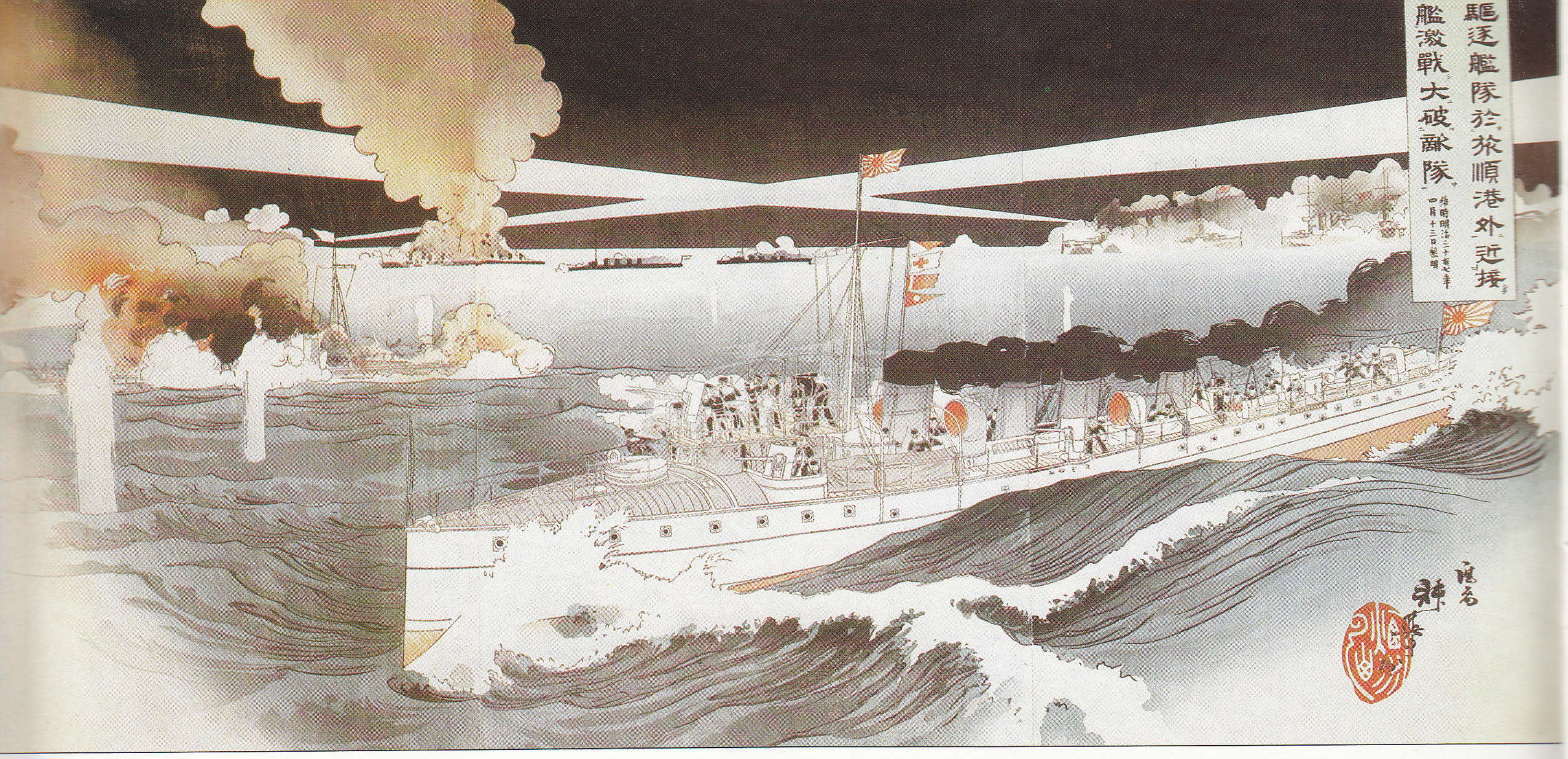
For weeks the Baltic Fleet swung at its moorings while its governmnt dithered on what to do next. The enervating climate took its toll of fitness, and mutinous behaviour became rife. Told to await reinforcements (in truth the dregs of the reserve list), the Russian admiral ignored the instruction, sailing on 16 March 1905. He was, however, finally obliged to stay in French Indo-China until they arrived, finally leaving on the last lap on 14 May.

Vladivostok lies within the Sea of Japan, the access to which is by several narrow passages. For Togo, geography was favourable: all he needed was patience. Rozhdestvensksy decided on the direct southern route through the Tsushima Strait. His fleet was in dreadful shape, hulls weedgrown, machinery and armament defective, and crews in need of recreation. What he needed was a spell in the dockyard, followed by a work-up. What he got was a pitched battle.

At 02.45 on 27 May, the Japanese auxiliary cruiser *Shinano Maru* sighted an oddly-lit ship in the misty moonlight. She kept in contact and,



Tsesarevitch *interned at Kiao Chau after the defeat of the Russian Pacific fleet off Round Island, August 1904. Steering by her screws after her rudder was destroyed in an earlier encounter, she flew the flag of Admiral Vitgeft, who was killed when the conning tower was struck by a 12-in shell. The rest of the fleet escaped back to Port Arthur, never to come out again.*


驅逐艦隊於旅順港外近接
艦激戰大破敵隊
維時明治三十七年
四月十三日黎明

A Japanese view of their torpedo-boats in action off Vladivostok, where a small Russian force under Skydlov lurked in harbour, occasionally launching sneak attacks on fishing boats. Defeating a 'European' Great Power had a lasting effect on Japanese foreign policy.

just before 05.00 in shifting visibility, was rewarded with the sight of Rozhdestvensky's full force, steaming north east in two columns. Her radio summoned cruiser aid and Togo's main fleet sailed from its waiting area on the Korean side of the strait, the opening moves in what was to be the greatest fleet encounter between Trafalgar and Jutland.

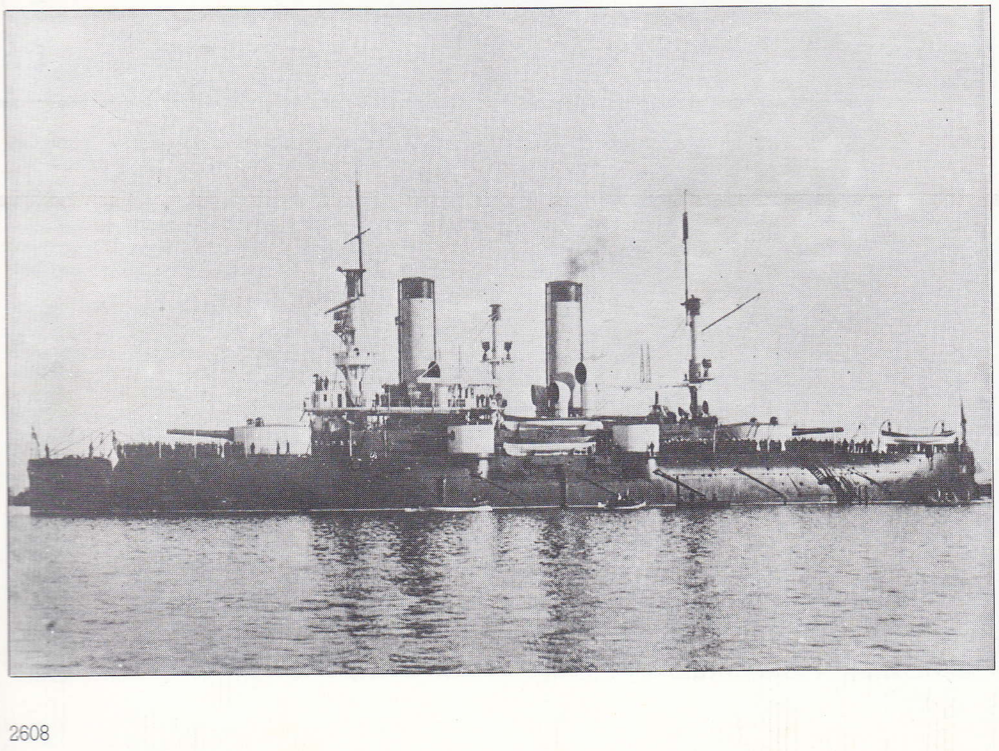
With 12 armoured ships apiece, the two fleets were evenly matched on paper. Indeed Rozhdestvensky's 1st Division consisted of four brand-new battleships, his flag in the *Kniaz Suvorov*.

Togo sighted the Russian ships, already disorganized in reforming, at 13.45. With a speed advantage of at least 4 (possibly as much as 7) kts, he crossed the Russians' bows from right to left and, daringly, turned 12 points in succession towards the Russians, ending on a parallel course. This manoeuvre caused Togo's ships to mask each other's fire whilst turning and the Russians, who opened fire at 7000 m (7,655 yards), inflicted some damage. The Japanese let the range decrease for another 1000 m (1,095 yards) before unleashing a crushing fire on the Russian van, concentrating on the leaders of the 1st and 2nd Divisions: the latter, *Osliabya*, wore the flag of Rear Admiral Folkersam, whose death by natural causes a few days before had been kept secret for morale purposes.

Russian line deflected

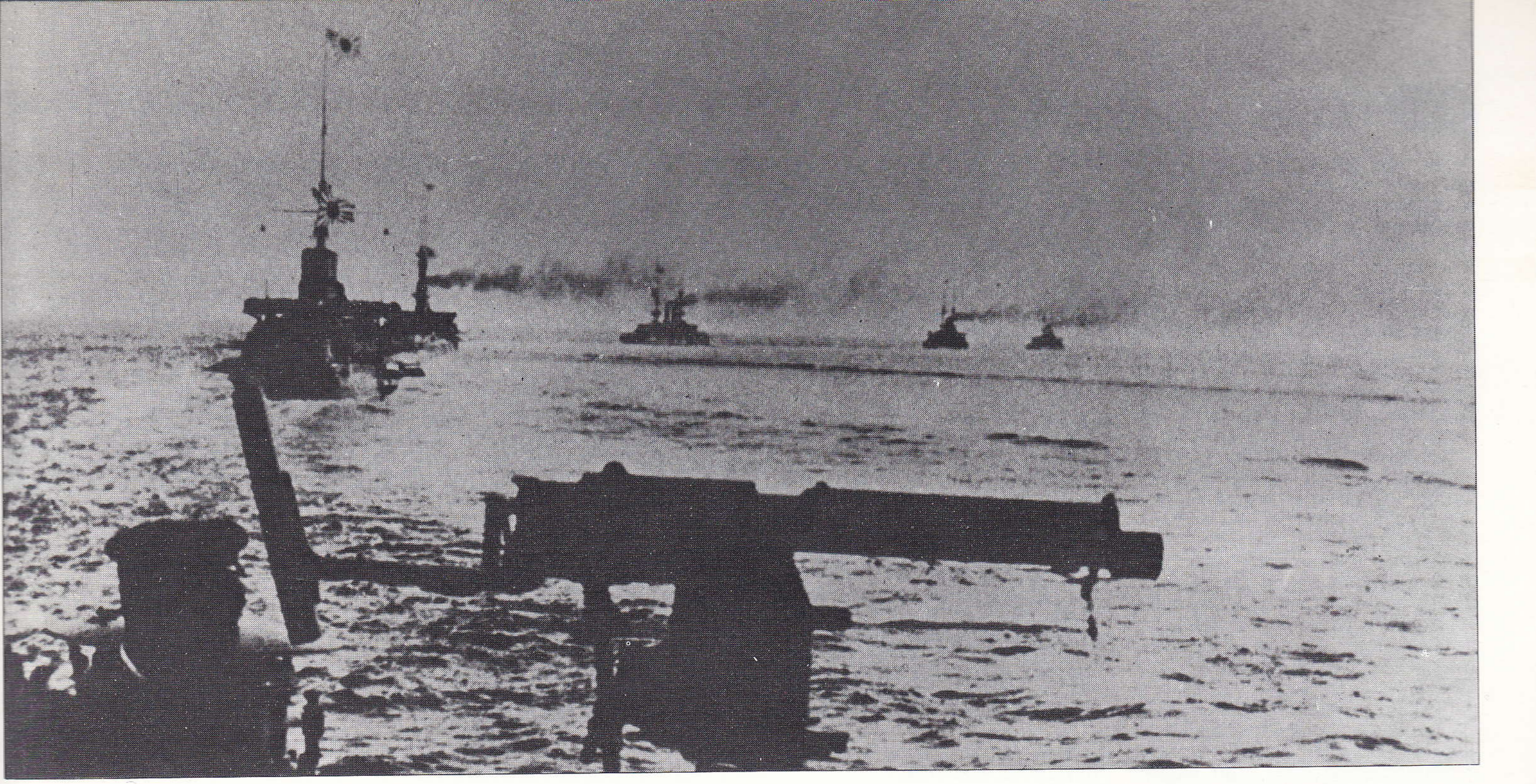
Unable to face the bombardment, the Russian line was deflected from a north east heading to south of east. Though moving in a longer arc, Togo had the speed both to keep up and to dictate range; disciplined and accurate gunnery did the rest.

Kniaz Suvorov, less funnels, a mast and the after turret, staggered blazing out of line and lost way, to become a target for everything that passed. The severely wounded Rozhdetvensky was taken off by destroyer and, later, transferred to another, from which the Japanese eventually captured him. As the *Osliabya*'s main belt was effectively submerged by the weight of extra coal that she was carrying, she fell prey to 203-mm (8-in) gunfire from Togo's armoured cruisers.



The three 'Poltava' class battleships were all in the Russian Pacific fleet based at Port Arthur in 1904. Petropavlovsk, *seen here, was mined and sunk, drowning Admiral Makarov, the only senior officer who was not a complete incompetent.*

Admiral Rozhdestvensky sailed the Baltic fleet across the world only to be defeated at Tsushima. He gained notoriety in Britain by opening fire on British trawlers in the North Sea, thinking them to be Japanese torpedo boats.



Mikasa leads Shikishima, Fuji and Asahi and two armoured cruisers as the Japanese fleet steams towards Tsushima strait. Once battle was joined, the superior efficiency of the Japanese fleet soon began to tell and Togo's ships began a methodical destruction of their opponents.

The two new divisional leaders, *Imperator Alexander III* and *Sessoi Veliky*, were equally harshly handled despite a dogged Russian defence. This critical phase had lasted only half an hour from 14.15 to 14.45, but the day was already decided. Nevertheless, at about 15.00 the Russians again pulled onto a northerly course for Vladivostok, only to be paralleled once again by Togo, who used the superior speed of his armoured cruisers to pull ahead and again deflect the battered Russian van to the southward.

A final attempt to break through to their goal was made by the Russians at about 17.00, but by now many of their major ships were in a very poor state. As the dreadful day eased into dusk, Togo pulled his heavy ships back and let loose his cruisers and torpedo craft. The *Kniaz Suvorov* succumbed to three torpedoes, *Imperator Alexander III* foundered, blazing, while the *Borodino* blew up. Four more were torpedoed during the long night, the *Navarin* and *Sessoi Veliky* sinking.

Five ships left

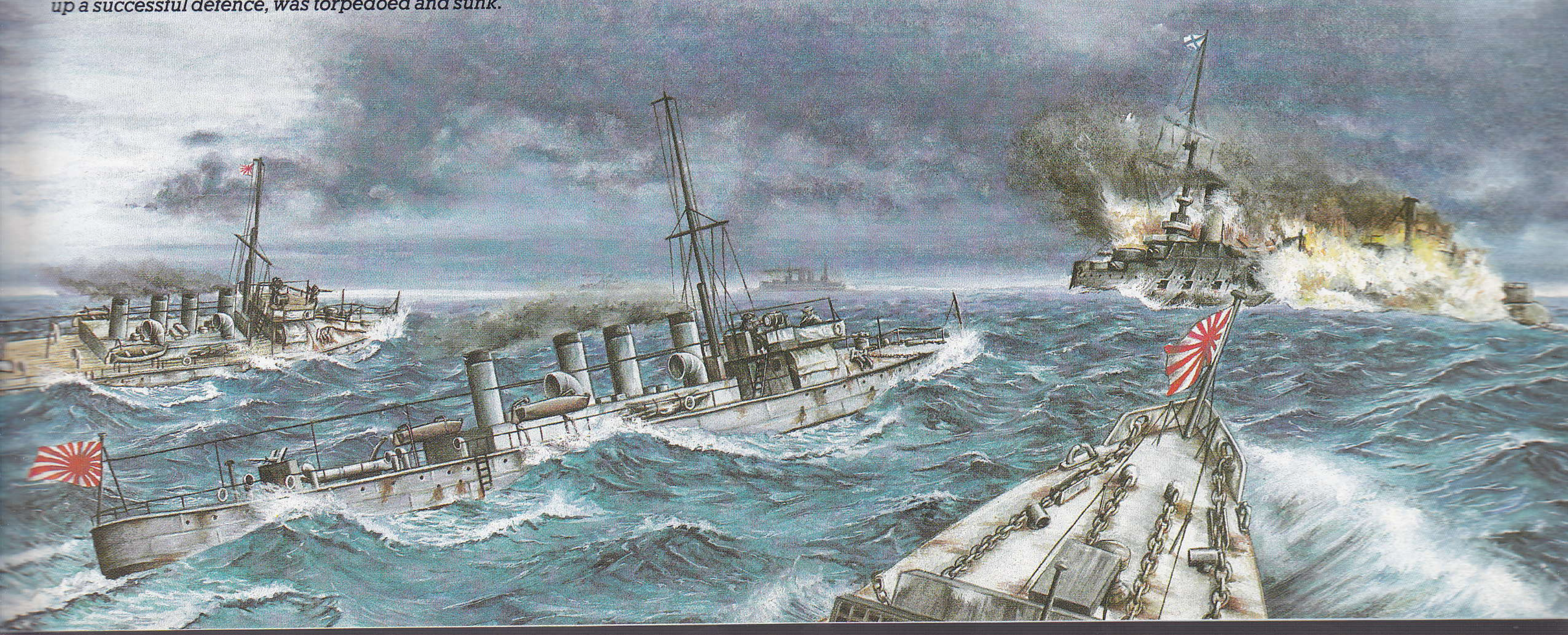
The hopeless dawn of 28 May found just five major Russian ships left, led by Nebogatov in the *Imperator Nicholas I*. They were still wallowing northward, but their goal was yet 480 km (300 miles) distant. With the strengthening light, one Japanese squadron after another came into view and at 10.30, after a desultory exchange of fire, Nebogatov surrendered rather than chance further bloodshed, a decision for which he was disgraced in his own land.

Only mopping-up was left to the Japanese and, finally, only one light cruiser and two destroyers arrived at Vladivostok with a tale of annihilation off Tsushima.

For the loss of three destroyers, the Japanese had sunk eight capital ships and captured four. Of eight cruisers, the Russians had suffered three sunk, one wrecked and three interned. Of nine destroyers, three were sunk, three interned and one captured. Of eight auxiliaries, five were sunk and two captured. There were 117 Japanese deaths and 4,830 Russian.

The scale of the victory precipitated the end of the war in Japan's favour and brought nearer the Russian revolution. It signalled the arrival of Japanese sea power and caused great satisfaction in the UK, which had virtually built and trained the Japanese navy.

Kniaz Suvorov was subject to a series of accurate broadsides from the Japanese battleships and staggered out of line, severely disabled. The wounded Admiral Rozhdestvensky was taken off his stricken flagship by a destroyer, and the Suvorov fell behind, having lost a funnel and her after mast. At 1700 hrs she was attacked by the 4th Japanese Torpedo Boat Division and, unable to put up a successful defence, was torpedoed and sunk.



UK

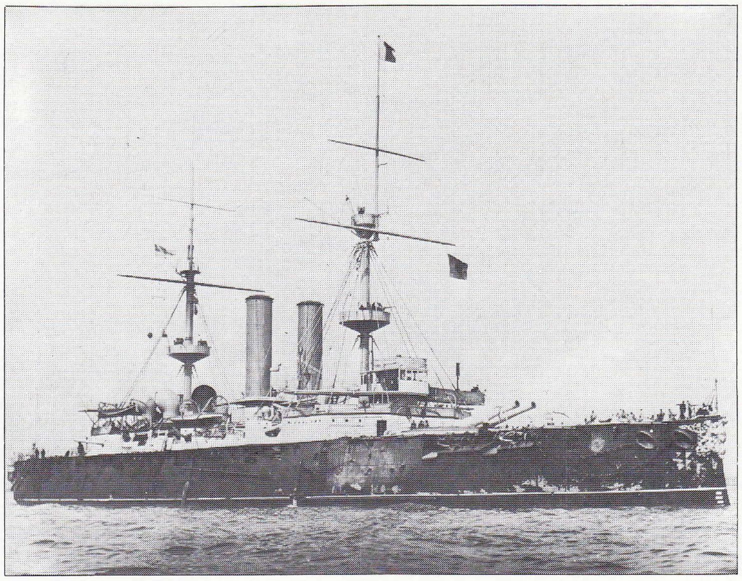
'Royal Sovereign' class

At a time when Royal Dockyards generally took over five years to build a battleship, HMS ***Royal Sovereign***, lead ship of the **'Royal Sovereign'** class, was built at Portsmouth in only 32 months. The reason was simply that 'Jackie' Fisher, a newly promoted rear admiral, had been appointed Admiral Superintendent just after her launch in February 1891 and took a personal interest. The other six ships (HMS ***Empress of India, Ramillies, Repulse, Resolution, Revenge*** and ***Royal Oak***) were launched in 1891-2.

In truth, the 'Royal Sovereigns' were a class transitional between the low-freeboard battleship and the true pre-Dreadnought. Since the abandonment of full sailing rig in the Royal Navy, freeboards had been kept low to reduce vulnerability to close-range gunfire and to reduce the necessary area of protection. This lack of freeboard was a great limitation in any sea, and the 'Royal Sovereigns' were built a full deck higher. While this placed the armament of four 343-mm (13.5-in) guns (no satisfactory 305-mm/12-in weapon was available) at a more commanding height, their weight could be accommodated only in open-topped barbettes where the paired guns were mounted on turntables that revolved within a low, armoured redoubt. The two barbettes were separated as widely as possible to allow the installation of a substantial and fully-enclosed secondary armament: these 10 152-mm (6-in) weapons had to be sited on two levels but were of the new quick-firing (QF) type designed to be effective against the growing threat from torpedo craft.

Extra freeboard of course meant extra area needing protection and, while the 'Royal Sovereigns' were not essentially superior to their foreign peers in this respect, they achieved it at reasonable penalty by adopting the new compound steel armour. Seven of the class were built, the eighth (HMS *Hood*) being completed in a modified fashion as the last low-freeboard battleship in order to accommodate the extra weight of turreted main armament.

All had been discarded by 1914 except the *Revenge* which, renamed HMS ***Redoubtable*** to release the name for a new battleship, was attached to the Dover Command. With her guns relined to reduce the bore to 305 mm (12 in) and her hull heavily bulged both to resist torpedoes and to allow the ship to be heeled by ballasting to increase elevation and range, she was used before the availability of suitable monitors for bombardment of enemy positions in Belgium at up to 14630 m (16,000 yards).



Left: HMS Royal Sovereign *was built a deck higher than contemporary battleships, and the increase in freeboard greatly improved her seakeeping. The last ship of the class, HMS* Hood *was completed in the old style to accommodate a turreted main armament, but was notably inferior.*

Specification

'Royal Sovereign' class

Displacement: 14,150 tons standard and 15,580 tons full load

Dimensions: length 115.8 m (380.0 ft); beam 22.9 m (75.0 ft); draught 8.4 m (27.5 ft)

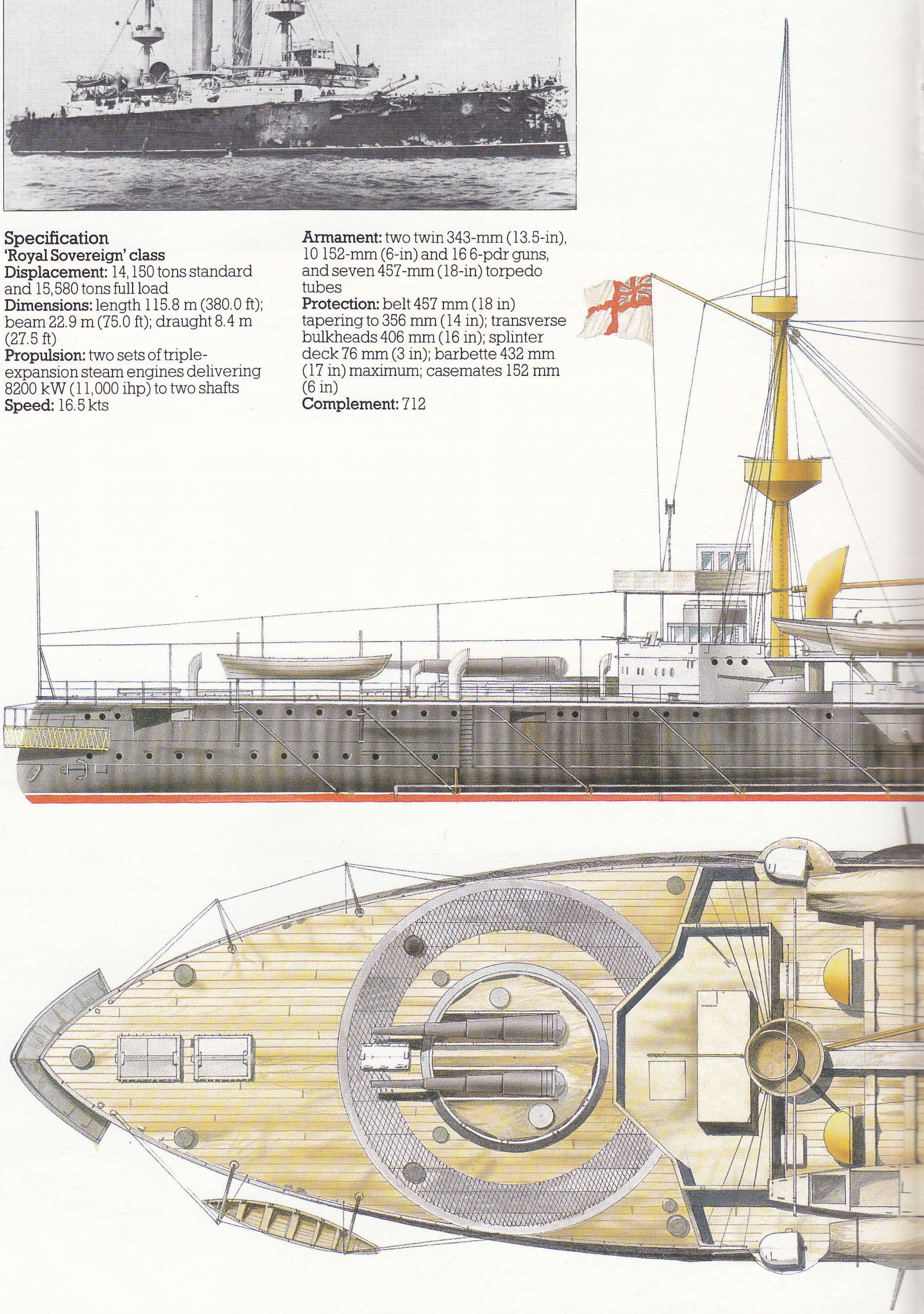
Propulsion: two sets of triple-expansion steam engines delivering 8200 kW (11,000 ihp) to two shafts

Speed: 16.5 kts

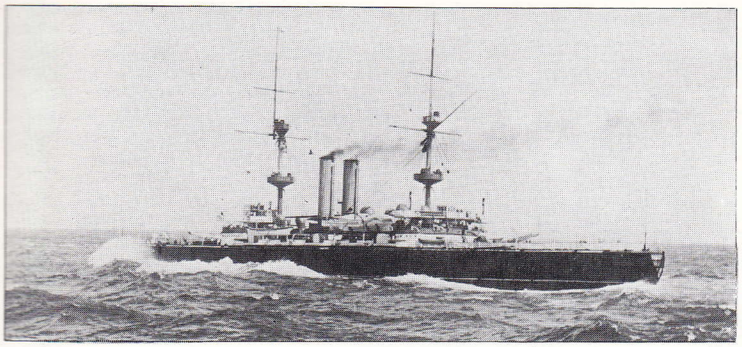
Armament: two twin 343-mm (13.5-in), 10 152-mm (6-in) and 16 6-pdr guns, and seven 457-mm (18-in) torpedo tubes

Protection: belt 457 mm (18 in) tapering to 356 mm (14 in); transverse bulkheads 406 mm (16 in); splinter deck 76 mm (3 in); barbette 432 mm (17 in) maximum; casemates 152 mm (6 in)

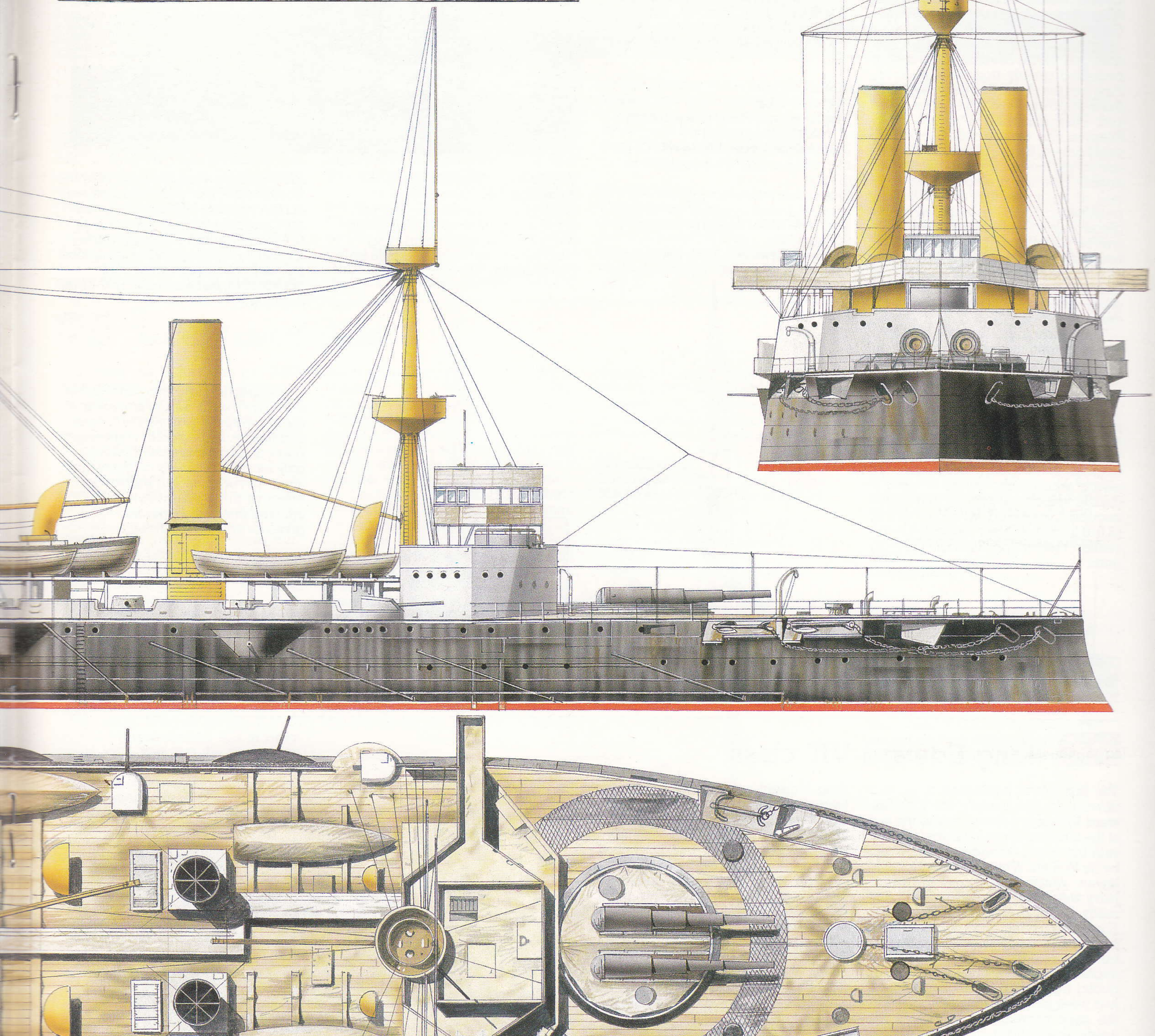
Complement: 712



HMS Royal Sovereign *in the magnificent Victorian livery of the 1890s. Thanks to a superlative effort by Portsmouth Dockyard she was completed in just 42 months, a record for the period. HMS* Royal Oak *could be distinguished from her six sisters as her steam pipes were forward of the funnels, but the others were practically identical. By the outbreak of war in 1914 all had been disposed of except HMS* Revenge, *which bombarded German positions on the Belgian coast.*



Left: HMS Royal Sovereign *and her sisters were built according to the dictates of the 1889 Naval Defence Act, which decreed that the strength of the Royal Navy should match that of the combined fleets of the second and third largest navies. Her increased size meant increased expense, but this was accepted as the price of Empire.*



UK

'Majestic' class

Where the 'Royal Sovereigns' were offspring of the 1889 Naval Defence Act, the nine **'Majestic' class** ships were begat by the 1893 'Naval Scare' where the combined strength of the French and Russian fleets (in hypothetical alliance) were held to pose a threat which the Royal Navy would find difficult to contain. They were fine ships, seven coming from Royal Dockyards, and combined all the features that set a new standard sufficiently high to give them the palm as the first true pre-Dreadnoughts. Launched in 1895-6, the class comprised HMS ***Caesar, Hannibal, Illustrious, Jupiter, Magnificent, Majestic, Mars, Prince George*** and ***Victorious***.

Superficially they looked rather like enlarged 'Royal Sovereigns', but they benefited greatly from new features. First was the protective deck sloped at the sides to meet the lower edge of the belt. Previously tried in the little HMS *Renown*, this feature was backed by coal bunkers to give improved protection to the machinery spaces as any armour-piercing projectile hitting the belt at an angle that would permit penetration would be deflected by the glacis behind. Secondly, the armour was of 'Harveyized' steel with a face-hardening so effective as to enable the 457-mm (18-in) belts of the 'Royal Quids' to be reduced to a combination of 223-mm (9-in) belt and 102-mm (4-in) deck.

The third important feature also saved weight, this being the adoption of a new-model 305-mm (12-in) gun. This 35-calibre weapon was far lighter than the earlier short 343-mm (13.5-in) gun and the smaller weight of the projectile was offset by 25 per cent greater penetrative power. This was due to the gun being a high-velocity weapon, combining new slow-burning propellants with a long barrel to yield a muzzle velocity of 732 m (2,400 ft) per second compared with the 615 m (2,016 ft) per second quoted for the earlier battleships' 343-mm (13.5-in) guns.

With so much weight saved, the previously open barbettes could be given an armoured hood, bunkers and ammunition capacity could be increased, and the output required of the main machinery could be lowered. The majority of the class were fitted for oil to be sprayed over the coal burning in the furnaces, for a rapid boost of output.

Most of the class saw war duty in home commands and the eastern Mediterranean, where four were involved with the Dardanelles operation. Of these, the *Majestic* was sunk (together with HMS *Triumph*) by Hersing's *U-21* in May 1915. Two torpedoes pierced her protective nets without hindrance and she capsized in seven minutes.

Specification

'Majestic' class

Displacement: 14,900 tons standard and 15,900 tons full load

Dimensions: length 128.3 m (421.0 ft); beam 22.9 m (75.0 ft); draught 8.2 m (27.0 ft)

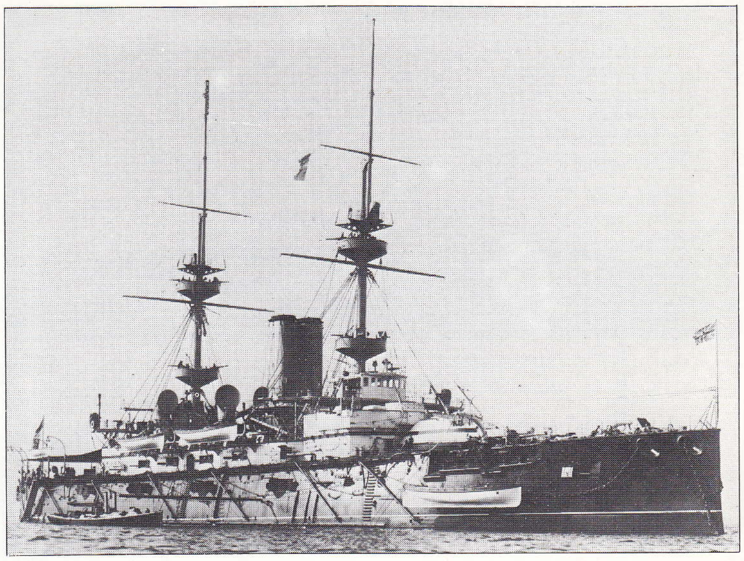
Propulsion: two sets of triple-expansion steam engines delivering 8945 kW (12,000 ihp) to two shafts

Speed: 17 kts

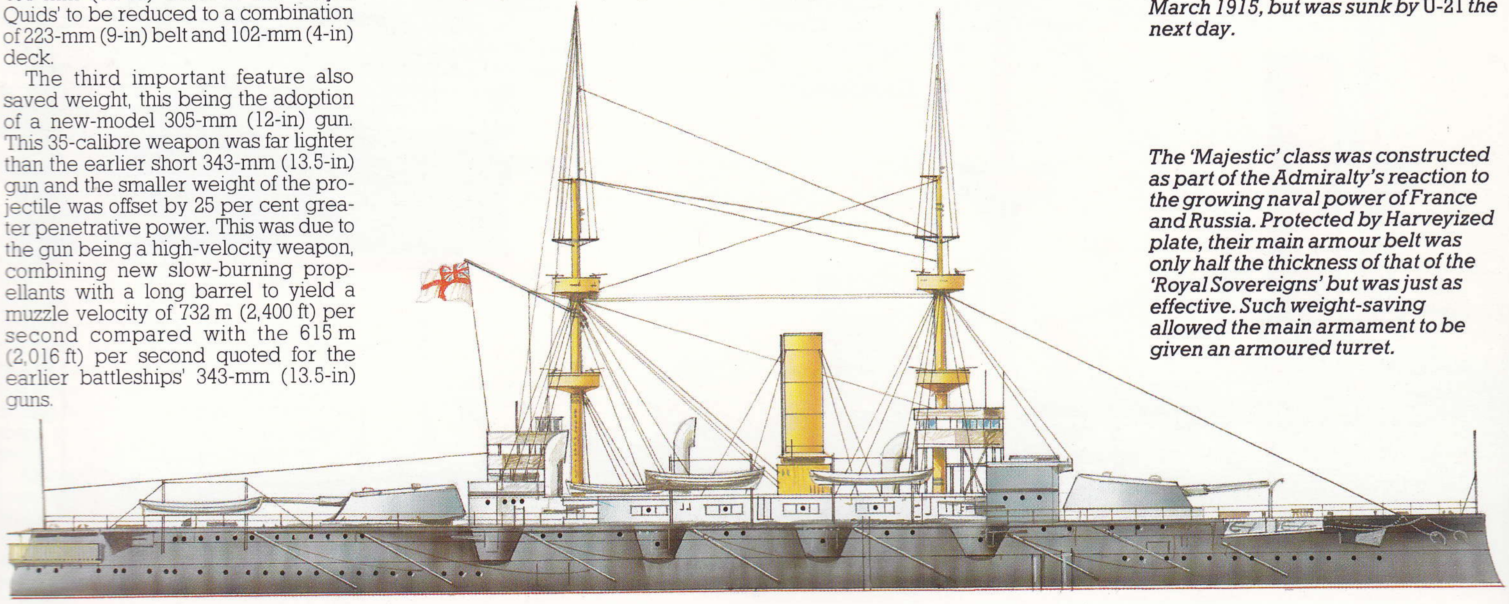
Armament: two twin 305-mm (12-in), 12 152-mm (6-in) and 16 12-pdr guns, and five 457-mm (18-in) torpedo tubes

Protection: belt 229 mm (9 in); transverse bulkheads 356-305 mm (14-12 in); splinter deck 102-706 mm (4-3 in); barbettes 356 mm (14 in) maximum; casemates 152 mm (6 in)

Complement: 670



HMS Majestic *went into reserve at the Nore in 1906, but was commissioned at Devonport in 1914 and escorted the Canadian troopships. She was Admiral Nicolson's flagship during the Dardanelles operations and took part in the bombardment of 18 March 1915, but was sunk by* U-21 *the next day.*

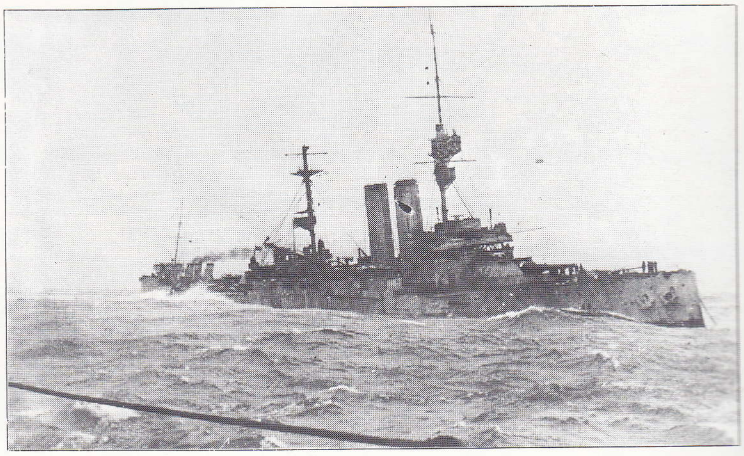


The 'Majestic' class was constructed as part of the Admiralty's reaction to the growing naval power of France and Russia. Protected by Harveyized plate, their main armour belt was only half the thickness of that of the 'Royal Sovereigns' but was just as effective. Such weight-saving allowed the main armament to be given an armoured turret.

UK

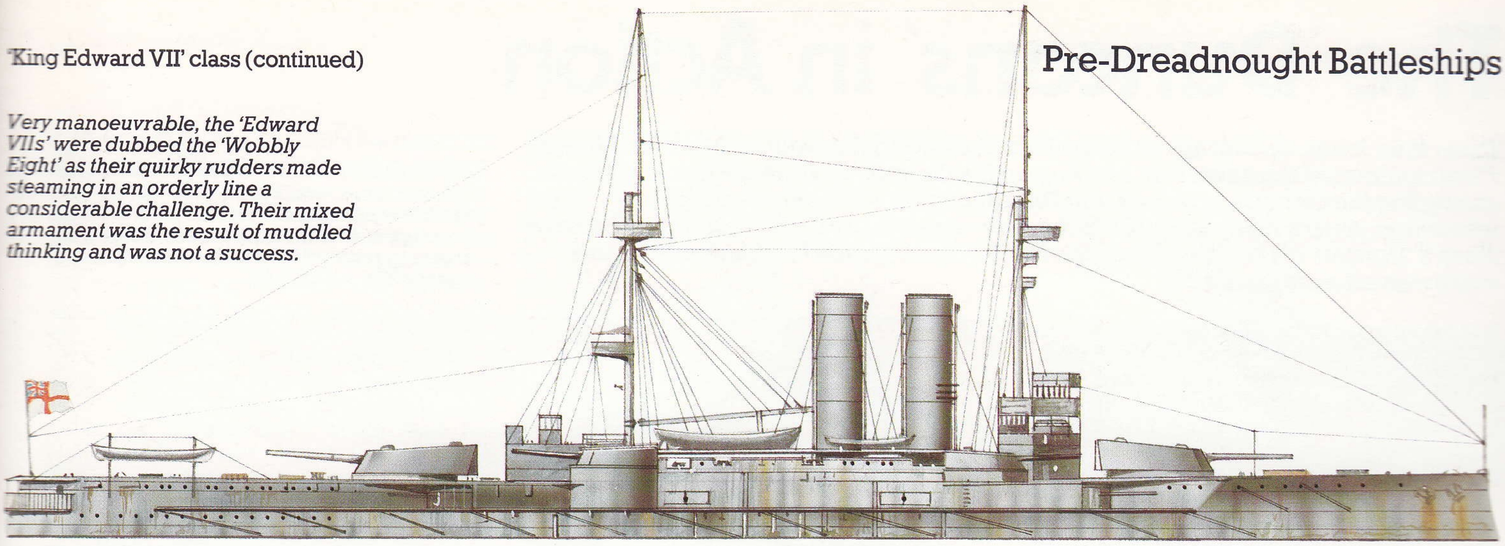
'King Edward VII' class

The first British battleships to be laid down in the 20th century, the **'King Edward VII' class** ships were also the last of the long line of capital ships (starting with the 'Royal Sovereigns') designed by Sir William White. In truth this basic layout, which had served the Royal Navy well, was now outdated and was really being only refined. The 'King Edward VIIs' were nearly 7 m (23 ft) longer than the preceding 'Duncans', but any seakeeping advantage this might have conferred was offset by reduced freeboard. Particular attention had been paid to manoeuvrability, but the ships proved very quirky on the helm, the rudder pintles wearing rapidly; because of their resulting odd course-keeping while in line, they received the popular name of the 'Wobbly Eight', a title not popular with the King himself, who had launched the lead ship and who had directed that she should always be a flagship. The final three of the class were built after the plans for the much improved 'Lord Nelsons' had been drafted and were obsolescent on completion. The ships, launched between 1903 and 1905, were HMS ***Africa, Britannia, Commonwealth, Dominion, Hibernia, Hindustan, King Edward VII*** and ***New Zealand***.



Edward VII had decreed that HMS King Edward VII *should always be a flagship and she joined the Grand Fleet in 1914, leading the 3rd Battle Squadron. Here she settles slowly in the water after hitting a mine off Cape Wrath. She capsized after 12 hours.*

Very manoeuvrable, the 'Edward VIIs' were dubbed the 'Wobbly Eight' as their quirky rudders made steaming in an orderly line a considerable challenge. Their mixed armament was the result of muddled thinking and was not a success.



The innovation of the class was in the mixed secondary armament. At this time the armoured cruiser was reaching the final phase of its design and its 190.5-mm (7.5-in) main battery calibre was giving way to the new 234-mm (9.2-in) type. This latter was an excellent weapon, well capable of piercing the average battleship belt at range then considered normal. Four single weapons were shipped by each of the 'King Edward VIIs' but, in a case of addled thinking, were mixed with the customary 10 152-in (6-in) guns. Thus not enough of the heavier guns were carried to make their inclusion worthwhile and the smaller-calibre weapons were squeezed into a box battery, behind the side armour but separated from each other by only a thin splinter screen. Their protection, redistributed because of the revised secondary and tertiary battery arrangements, was also downgraded almost immediately by the introduction of the APC projectile, an armour-piercing shell with a soft cap that prevented it shattering on hitting the hard surface of cemented armour. The *New Zealand* was later renamed ***Zealandia*** to free the original name for a battlecruiser, and the *Britannia* and *King Edward VII* were lost in World War I.

Specification

'King Edward VII' class

Displacement: 16,350 tons standard and 17,100 tons full load
Dimensions: length 138.3 m (453.75 ft); beam 23.8 m (78.0 ft); draught 7.8 m (25.5 ft)
Propulsion: two sets of triple-expansions steam engines delivering 13420-kW (18,000 ihp) to two shafts
Speed: 18.5 kts
Armament: two twin 305-mm (12-in), four 234-mm (9.2-in), 10 152-mm (6-in) and 14 12-pdr guns, and four 457-mm (18-in) torpedo tubes
Protection: belt 229-192 mm (9-4 in); transverse bulkheads 305-203 mm (12-8 in); decks 51, 51 and 64 mm (2, 2 and 2.5 in); barbettes 305 mm (12 in) maximum; battery 178 mm (7 in)
Complement: 780

UK

'Lord Nelson' class

Together with her sister HMS ***Agamemnon,*** HMS ***Lord Nelson*** was the last of the British pre-Dreadnoughts. Having been preceded by the frigate *Nelson* of 1876 and followed by the battleship *Nelson* of 1925, it is not clear why the 'Lord' was added. The **'Lord Nelson' class** was the logical extension of the 'King Edward VIIs', but the ships' construction was commenced only just before that of HMS *Dreadnought*, their guns were purloined for the latter's swift completion and, finally, the two were not completed until nearly two years after, already obsolete.

An interesting point is that these, the last of the old school, cost little more than contemporary armoured cruisers at about £1.54 million each, while the revolutionary newcomer seemed comparatively inexpensive at £1.78 million.

The main lessons of the Russo-Japanese engagements, still in progress in 1905, was that the big-calibre gun looked set to dominate and dictate the course of an action before secondary armaments were even in range. The decision to uprate the whole secondary battery to 234-mm (9.2-in) calibre was, therefore, vindicated, though an apparent suggestion to recast the ships to an all 305-mm (12-in) layout fell on deaf ears. Ten 234-mm (9.2-in) guns were carried, an unusual number due to the centre turrets having to be singles. This was in order to restrict the beam, comparatively arbitrarily, to fit certain drydocks. One strength of German equivalents was, of course, their excellently subdivided hulls and large beams, so that this restriction was certainly inhibiting. As it was, the two 'Lord Nelsons' were shorter than their predecessors and, being designed to the maximum beam, proved remarkably handy.

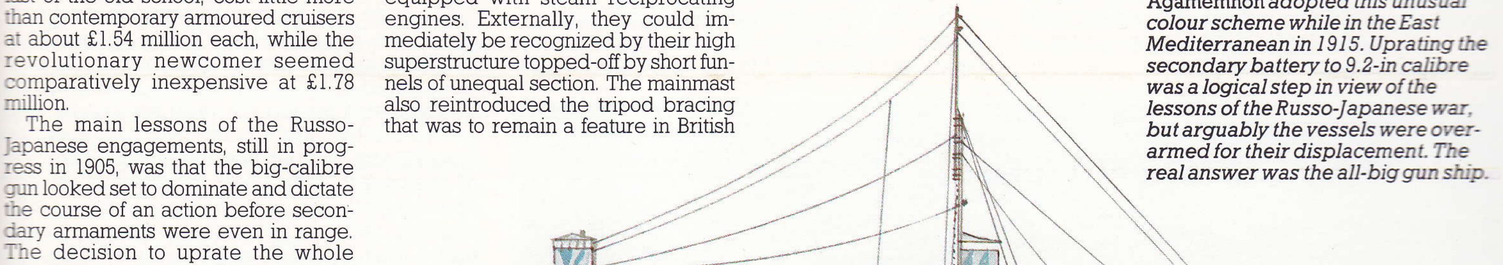
By tight design, they achieved improved protection at almost no weight penalty, the area of armour being kept to an absolute minimum. One-third of their bunker capacity was for oil but they were the last British battleships equipped with steam reciprocating engines. Externally, they could immediately be recognized by their high superstructure topped-off by short funnels of unequal section. The mainmast also reintroduced the tripod bracing that was to remain a feature in British warships for many years to come. Both ships performed valuable service in the eastern Mediterranean, particularly the Dardanelles, but were always overshadowed by their successors.

Specification

'Lord Nelson' class

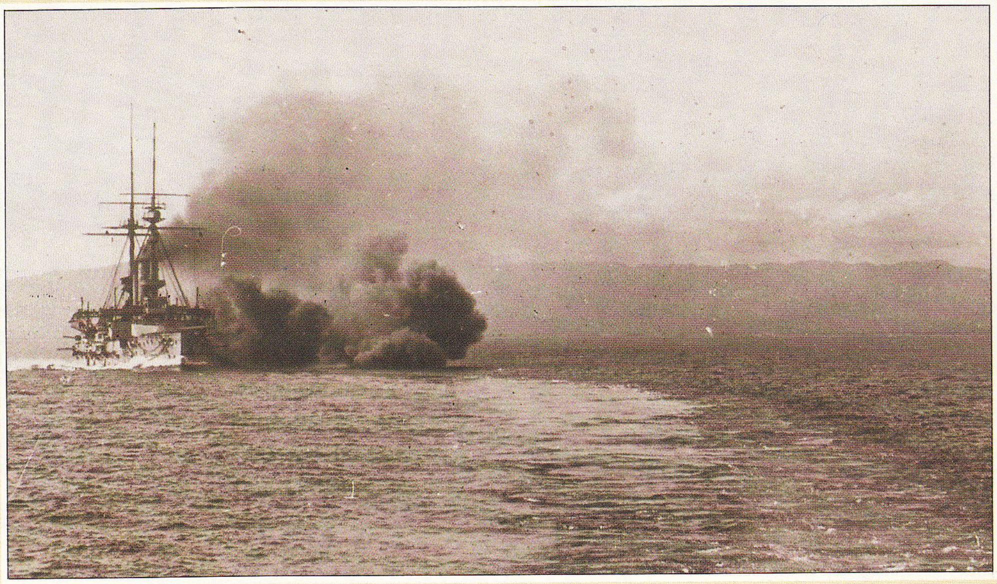
Displacement: 16,500 tons standard and 17,750 tons full load
Dimensions: length 135.2 ft (443.5 ft); beam 24.2 m (79.5 ft); draught 7.9 m (26.0 ft)
Propulsion: two sets of triple-expansion steam engines delivering 12490 kW (16,750 ihp) to two shafts
Speed: 18 kts
Armament: two twin 305-mm (12-in), four twin and two single 234-mm (9.2-in), and 24 12-pdr guns, and five 457-mm (18-in) torpedo tubes
Protection: belt 305-102 mm (12-4 in); transverse bulkheads 203 mm (8 in); decks 38, 102 and 76 mm (1.5, 4 and 3 in); barbettes 305 mm (12 in) maximum; secondary turrets 178 mm (7 in)
Complement: 810

Agamemnon *adopted this unusual colour scheme while in the East Mediterranean in 1915. Uprating the secondary battery to 9.2-in calibre was a logical step in view of the lessons of the Russo-Japanese war, but arguably the vessels were over-armed for their displacement. The real answer was the all-big gun ship.*



The 'Duncans' in Action

From their lonely anchorage at Scapa Flow the mighty Dreadnoughts of the Grand Fleet dominated the naval war, bottling up the German High Seas Fleet and slowly strangling the German economy. But Dreadnoughts were too precious to be risked elsewhere, and so many tasks fell to the now obsolete pre-Dreadnoughts. The Royal Navy's 'Duncan' class served from the North Atlantic to the Mediterranean, and were viewed as expendable.



HMS Duncan *fires a broadside from her 12-in Mk IX (305-mm) guns, which fired a 385-kg (850-lb) shell capable of piercing 406 mm (16 in) of armour plate at a range of 4500 m (5,000 yards). When firing at a target at a range of 9000 m the shell reached a height of 370 m (1,200 ft).*

It is something of a paradox that while for most of Admiral Sir John Jellicoe's magnificent squadrons of Dreadnoughts the naval war of 1914-8 was one of much boredom, the older and obsolete battleships enjoyed for the most part a far more varied programme. The reason was simple, in that it was the principal role of the Grand Fleet to contain the German High Seas Fleet. The Grand Fleet's task was complicated by the fact that the Germans, while not so inferior in strength, adopted a 'fleet-in-being' stance, rarely challenging, seldom taking risks but, because of the short distance of their bases from British shores, always threatening. Mounting what was in reality a distant blockade, the Grand Fleet could never move far from home waters and occupied itself with interminable sweeps and exercises, punctuated by brief periods in bleak northern anchorages.

At the outbreak of World War I the High Seas Fleet could muster 34 capital ships by including in its number 16 pre-Dreadnoughts and the hybrid SMS *Blücher*. To match this line-up, the Grand Fleet too had initially to include pre-Dreadnoughts, the third of its four battle squadrons comprising the 'King Edward VIIs'. While the newest of these was only seven years old, the class was 3 kts slower than the Dreadnoughts and each ship carried only four main battery guns compared with 10, disparities so marked that the squadron was always banished to the tail of the line to avoid slowing deployments. Even when relieved by new ships in 1915, the eight were retained as a coherent force in the Channel Fleet, being based particularly in Nore Command to counter any enemy thrust in strength toward the Thames on the vital cross-channel routes.

The next oldest pre-Dreadnought class were the 'Duncans', and these were viewed as a more expendable asset. They were initially grouped in the 6th Battle Squadron, but this arrangement was soon broken down as the needs of a world war indicated that such ships still had a useful (indeed vital) role to play in lower-risk theatres elsewhere.

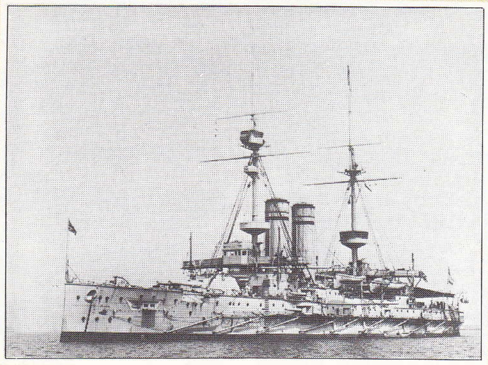
Six 'Duncans' had been completed in 1903-4, the numbers soon being reduced by HMS *Montagu*'s wreck off Lundy in 1906. Three of the remainder (HMS *Albemarle, Exmouth* and *Russell*) were available at the outbreak of war and immediately joined the Grand Fleet at Scapa. Any thought of instant glory were soon quelled by their attachment to the Northern Patrol, where the weary winter months were spent reinforcing the totally unsuitable old 'Edgars' of the 10th Cruiser Squadron. Working the wild waters of the UK-Faroes-Iceland gap and its eastern approaches, the 10th CS had the unenviable task of detecting every merchantman in transit to and from the northern North Sea and, if not immediately satisfied as to its content and movement, sending it into Kirkwall or Lerwick for examination.

The work was onerous but of vital importance as one line of the blockade that denied to the enemy his raw materials and many staples. Gradually, the regular warships were replaced by the better-suited armed merchant cruisers, of longer endurance and infinitely more comfortable in a northern seaway. It is recorded that the *Albemarle*, running through the Pentland Firth in the teeth of a winter gale, hit a sea so fierce as to smash the charthouse and carry away the bridge. Having spent a spell in dockyard hands as a result, she was rewarded by being packed off to northern Russia to cover growing Allied interests in the area. Her predecessor, the cruiser HMS *Iphigenia* (later to win fame as a blockship at Zeebrugge) was inconveniently small, particularly when it came to being required to act as an icebreaker to keep open the port of Archangel!

Zeebrugge bombardment

Exmouth and *Russell*, meanwhile, had preceded the 'King Edward VIIs' to join the Channel Fleet. In November 1914, screened by destroyers, led at a stately pace by minesweeping trawlers and hoping (in vain) for the spotting services of two airships, the two conducted the first of many bombardments of the Belgian port of Zeebrugge, which was targeted as already housing both UB- and UC-type German submarines, well-placed to disrupt cross-channel traffic. With their 7.85-m (25.75-ft) draughts, the battleships were obliged to remain well offshore, firing at ranges from 5000 m (5,475 yards) up to as much as 11000 m (12,030 yards). In an hour they put down about 400 rounds of 305- and 152-mm (12- and 6-in) fire, concentrating on the harbour installations, the railway and the lockgates to the Bruges canal. Later bombardments were conducted mainly by specialist shallow-draught monitors, but the severity of

The six 'Duncan' class battleships were produced in response to the three 'Peresviet' class 'fast battleships' laid down by Russia in 1895. In fact the Russian ships had nothing like the performance they were credited with. Pobieda*, seen here, was sunk in Port Arthur together with* Peresviet.



HMS Duncan *was serving with the Channel Fleet in 1906 when her sister HMS* Montague *went hard aground on Lundy Island in thick fog.* Duncan *endeavoured to assist but grounded herself. She was eventually floated off, but* Montague *was wrecked and had to be broken up where she lay.*

Although unable to stand in line of battle against Dreadnoughts, earlier battleships like the 'Duncans' were still a potent force and, had they been handled with a more Nelsonic touch at the Dardanelles, Turkey might have been knocked out of the war in 1914.

this opening round was probably the reason for the Germans shifting their submarine base inland to Bruges.

With the start of the Dardanelles campaign early in 1915, two 'Duncans' went out to the Mediterranean, among the first of many. In the sense of a great opportunity lost, the Dardanelles could be termed the pre-Dreadnoughts' Jutland for, despite the outright hostility of Fisher, leadership of the calibre of Admiral Keyes would have seen the Strait forced, albeit with losses. A strong force appearing at this time off Constantinople would have put Turkey out of the war before she could be organized or buttressed by the Germans.

HMS *Cornwallis* was, literally, the first in action in the campaign proper. On 19 February 1915, as one of a 12-strong Anglo-French bombardment group, she was first to fire on the Dardanelles' outer fortifications, a 10000-m (10,935-yard) ranging shot at Orkanie battery on the south side of the Strait. The *Duncan* involved in almost every other activity of note during the year of the campaign, being also among the last to leave in the following December, joining a force tasked with protecting the Suez Canal from Turkish land attack.

Army fire support

An almost endless chore following the inception of the great Gallipoli stalemate was fire support for the army. There was initially little to fear from the sea and, despite German submarine successes in the North Sea, there existed a measure of complacency. This complacency was rudely shaken in mid-May when the *Cornwallis* accompanied the older HMS *Goliath* ('Canopus' class) into Morto Bay just inside Cape Helles, for the latest in a series of nocturnal bombardments in support of the French right wing. Anticipating their coming, a Turkish destroyer under temporary German command had slipped down the Strait, unnoticed by British standing patrols through keeping close aboard the steep-to coastline on the European (north) side. This boldness paid off for the destroyer managed to approach to within 1000 m (1,095 yards) before being challenged by the *Goliath*. It was too late, for three torpedoes were in the water and all hit her. While the *Cornwallis* was unscathed, her compatriot foundered with great loss of life and her assailant escaped in the confusion. The affair caused such alarm at the Admiralty that the new battleship HMS *Queen Elizabeth* was called home and her place taken by two further 'Duncans'.

The *Russell* and *Albemarle* were withdrawn from the Grand Fleet's 3rd Battle Squadron and the former was involved in one of the very last naval support tasks off Gallipoli. In the early days of 1916, the Helles withdrawal was well under way when suddenly the Turks came alive to the fact that only 19,000 men remained, a rearguard that included a Royal Naval Division. A terrible barrage was laid from both sides of the strait onto the little perimeter. Steeling themselves to meet the mass assault that would inevitably come when the fire lifted, the soldiers were suddenly heartened by the deeper roar of naval gunfire. Supported by cruisers and monitors, the old battleship's big guns enfiladed the enemy trenches, the awful effect of the Lyddite beating the fight out of the Turks before they even advanced. Attached to the group was the destroyer HMS *Scorpion*, commanded by one Andrew Cunningham who, a quarter century later, would make his name in Mediterranean waters as the great 'ABC'.

A few months later the *Russell* was mined and sunk off Malta with considerable loss of life. While the old battleships could absorb gunfire and the odd torpedo, they seemed vulnerable to mines. The *Cornwallis* was hit by three torpedoes from a U-boat in January 1917 but stayed afloat for a considerable time before foundering.

The *Exmouth*'s experiences were much the same as those of the *Russell* in being used to smash the Turkish defences before one more weary assault on the seemingly impregnable peak of Achi Baba. Supporting her were two cruisers, one French and the other HMS *Talbot*, late of the 10th CS, the 'Edgars' which had been fitted with bulges to improve their resistance to torpedo hits and to allow them to be listed as a means of increasing gun elevation and range.

With German submarines arriving, bombarding ships now were obliged to keep on the move, reducing their effectiveness. Shallow-draught monitors were also making their appearance, cheap ships armed frequently with secondary guns removed from decommissioned battleships. Though outdated, pre-Dreadnoughts still represented a considerable scalp for a submarine commander, the *Exmouth* moved down to Imbros to lie behind heavy net defences while acting as headquarters ship for both the 'Edgars' and the monitors.

For a period, a force of the old ships was maintained at Mudros and Salonika to cover any breakout by the German battle-cruiser SMS *Goeben* and to show support for Greece against any incursions by the Central Powers. With the end of the Dardanelles operations, however, the Mediterranean became something of a backwater and in July 1917, when the old 'Formidable' class HMS *Implacable* pulled out, not one British battleship remained there in full commission. With many others, the surviving three 'Duncans' paid off into reserve to release their crews for newer ships. They disappeared finally in the scrappings of 1919-20.

After 1921 only one pre-Dreadnought remained to the Royal Navy, HMS *Agamemnon* which, disarmed and acting as a radio-controlled target ship, served until 1926, when relieved by HMS *Centurion*. Of the High Seas Fleet, SMS *Hessen* provided a similar service, while SMS *Schlesien* and *Schleswig-Holstein* went on to see their second war.

The 'Canopus', 'Formidable', 'London' and 'Duncan' classes of battleship were all strikingly similar in appearance; this is HMS Duncan *at Mudros with the armoured cruiser HMS* Drake *seen astern. Naval gunfire was invaluable to the army throughout the Dardanelles campaign.*

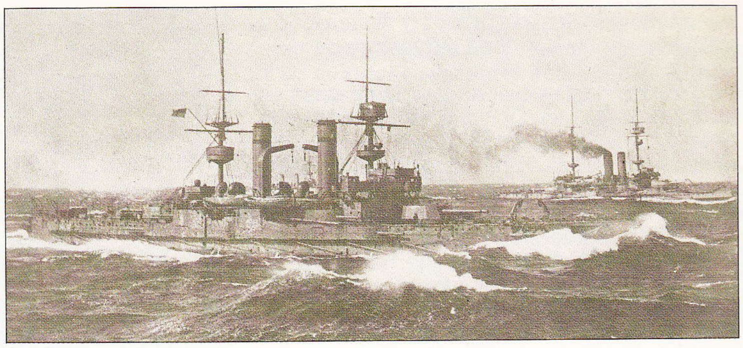
UK

'Swiftsure' class

From time to time in emergency the British Admiralty appropriated warships building to foreign account, but the compulsory purchase of two Chilean battleships in 1903 could only have been because of a suspicion that the customer might default and offer the ships to a rival fleet (that of Russia). Certainly they were of little use to the Royal Navy as they were underarmed and too lightly built to take their place in the main line. They had been ordered as a counter to the Chilean's usual rivals, the neighbouring Argentines, which were building the final pair of a group of fast ships carrying both 254- and 203-mm (10- and 8-in) guns. As these were rated armoured cruisers, the Chileans opted for a pair of battleships, whose scantlings and armament would be scaled for local, rather than European, disputes.

The Royal Navy already had three small 254-mm (10-in) gunned battleships, but these were sized especially for foreign flag duties, particularly in China. In the case of the **'Swiftsure' class**, the hulls were about 30.5 m (100 ft) longer but of the same beam to achieve the required 20 kts. Interestingly, the small battleships in the Far East had seen both Jellicoe and Beatty make their mark in more junior ranks, while Fisher preferred HMS *Renown* in the Mediterranean. Indeed, with the high speed of the 'Swiftsures' (the first in the Royal Navy to exceed 20 kts) and their mixture of 254- and 190.5-mm (10- and 7.5-in) guns, they very much followed the Fisher ideal of the 'smallest effective big gun and the largest possible secondary gun'. On such narrow-gutted ships, the large casemates demanded by the 190.5-mm (7.5-in) guns dominated the amidships layout. Corners were cut in overall protection which, while permissible with Argentine 254-mm (10-in) shells in mind, would have proved vulnerable to an unlucky hit by a 305-mm (12-in) round. This was particularly true of those parts of the barbette structure behind the main armoured bulkheads. The ships' two tall, symmetrical funnels and gooseneck boatcranes gave them a very distinctive silhouette.

Both ships were active in the Dardanelles campaign, HMS ***Swiftsure*** having already seen service in the Suez area and the Red Sea and HMS ***Triumph*** commissioning from reserve in Hong Kong. The latter was torpedoed and sunk while assisting with fire support. Her loss, together with that of HMS *Majestic*, signalled the end of the Royal Navy's traditional close investment policy.



Easily distinguished from other British battleships by her gooseneck cranes, HMS Triumph *and her sister were being built for Chile by Armstrong, but the Admiralty issued a compulsory purchase order after it seemed they were to be sold to Russia by Chile.*

Specification

'Swiftsure' class

Displacement: 11,800 tons standard and 13,850 tons full load

Dimensions: length 146.2 m (479.75 ft); beam 21.6 m (71.0 ft); draught 7.7 m (25.33 ft)

Propulsion: two sets of triple-expansion steam engines delivering 9230 kW (12,500 ihp) to two shafts

Speed: 19 kts

Armament: two twin 254-mm (10-in), 14 190.5-mm (7.5-in), 14 14-pdr and two 12-pdr guns, and two 457-mm (18-in) torpedo tubes

Protection: belt 178-76 mm (7-3 in); transverse bulkheads 152 mm (6 in); decks 76-25 mm (3-1 in); barbettes 254-mm (10 in) maximum; casemates 178 mm (7 in)

Complement: 800

GERMANY

'Kaiser' class

The immediate result of the accession of the naval-minded Kaiser Wilhelm II in 1888 was the laying down of the first group of four seagoing battleships, the **'Brandenburg' class**. Though these were exactly contemporary with the British 'Royal Sovereigns', they were remarkably different in layout. Of the same length, they were of less beam and, though of less power, were reasonably fast. Their major feature was a six-gun main battery of 280-mm (11-in) guns in a twin mounting at each end and a third in a gap in the superstructure, the last with barrels of reduced length. Despite this, the ships had a unique six-gun broadside at a time when four was the norm, an example of advanced thinking but at the cost of inadequate protection.

To a certain extent, therefore, the following five-ship **'Kaiser' class** launched between 1896 and 1900 was something of a disappointment as, in endeavouring to rectify the earlier ships' deficiencies, their designers produced something little different from contemporaries abroad. The interesting decision was not to increase the calibre of guns to match the 305-mm (12-in) usual in foreign battleships, but to reduce it to 240-mm (9.4-in) and to cut the number to four, set in the usual manner, with a twin mounting both forward and aft. The penetrative power of these guns was the equal of most vertical belts only at close ranges, and the anticipated compensation of a high rate of fire evidently did not materialize. Again, protection was below par, with a very shallow belt that extended over only the forward 80 per cent of the length, and linked across top and bottom by protective and splinter decks. The reason for this economy was the shipping of a heavy secondary armament of 16 150-mm (5.9-in) guns. Only four of these were mounted in casemates, the remainder being grouped at main deck level in a superstructure protected only at each end but so shaped as to permit a maximum of axial fire. Reconstructed in 1906, the ships lost their four casemated weapons, which were of little use in a seaway but, in doing so, increased freeboard to the extent that the belt was virtually clear of the surface. Of low fighting value by 1914, SMS ***Kaiser Barbarossa, Kaiser Friedrich III, Kaiser Karl der Grosse, Kaiser Wilhelm II*** and ***Kaiser Wilhelm der Grosse*** were used for training and accommodation during World War I.

Specification

'Kaiser' class

Displacement: 10,970 tons standard

Dimensions: length 125.0 m (410.1 ft); beam 20.2 m (66.3 ft); draught 7.8 m (25.6 ft)

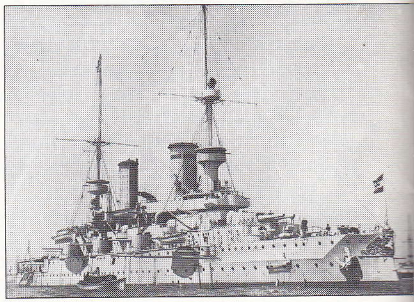
Propulsion: three sets of triple-expansion steam engines delivering 9880 kW (13,250 ihp) to three shafts

Speed: 18 kts

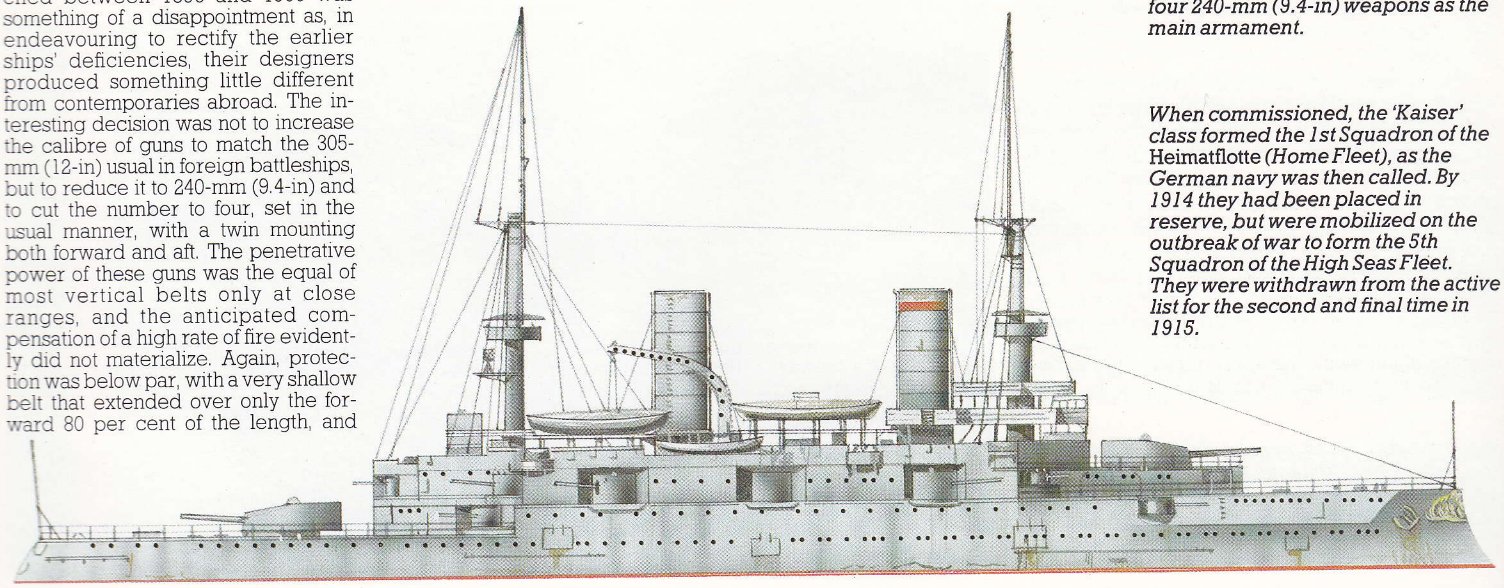
Armament: two twin 240-mm (9.4-in), 19 150-mm (5.9-in) and 12 88-mm (3.46-in) guns, and six 457-mm (18-in) torpedo tubes

Protection: belt 300 m (11.8 in); transverse bulkheads 200 mm (7.9 in); decks 75 and 60 mm (2.95 and 2.36 in); barbettes 250 mm (9.8 in) maximum; casemates and secondary turrets 150 mm (5.9 in)

Complement: 670



Seen here in 1902, SMS Kaiser Friedrich III *represented a step backwards for German naval architecture after the bold and innovative 'Brandenburg' class. The heavy secondary armament of 16 150-mm (5.9-in) guns could not compensate for the weak choice of four 240-mm (9.4-in) weapons as the main armament.*

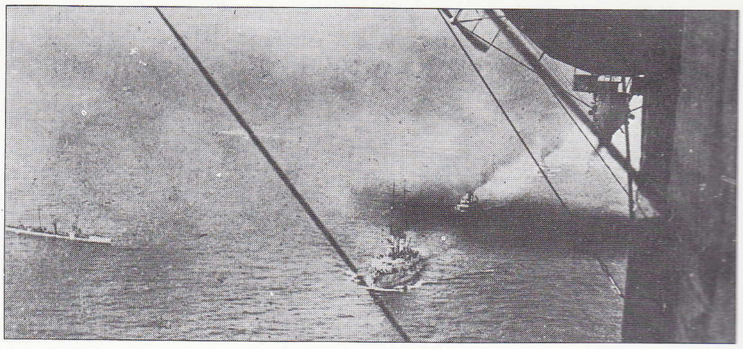


When commissioned, the 'Kaiser' class formed the 1st Squadron of the Heimatflotte (Home Fleet), as the German navy was then called. By 1914 they had been placed in reserve, but were mobilized on the outbreak of war to form the 5th Squadron of the High Seas Fleet. They were withdrawn from the active list for the second and final time in 1915.

GERMANY

'Wittelsbach' class

Like the preceding 'Kaisers', there were five **'Wittelsbach' class** battleships which, though of the same armament, had a very different layout. Launched in 1900-1, the ships were SMS ***Mecklenburg, Schwaben, Wettin, Wittelsbach*** and ***Zahringen***. They retained the small 240-mm (9.4-in) main battery gun, paired fore and aft, but differed in having a flush main deck which effectively raised the after turret by one level. The forward turret remained elevated a further level on a high barbette. The hull was some 5 m (16.4 ft) longer and commensurately beamier but, in adopting the more effective Krupp cemented armour in place of the earlier ships' Harvey nickel steel, a greater area of thinner plate was incorporated for the same degree of protection. Where the earlier ships had a narrow belt over about 80 per cent of the length with only armoured trunks to the turrets above, the 'Wittelsbachs' could accommodate full-length protection and, surprisingly, resurrect the old central battery concept. Its weight precluded extending this battery to any height, so that the eight 150-mm (5.9-in) guns that it contained were carried at a low level. Two further weapons were sited in protected casemates at the same level farther aft, the height of the forward 240-mm (9.4-in) guns, which must have been greatly affected by blast. Thus, to obtain the exceptionally heavy chase fire of two main and eight secondary barrels, the layout left much to be desired in a seaway and blast interference.

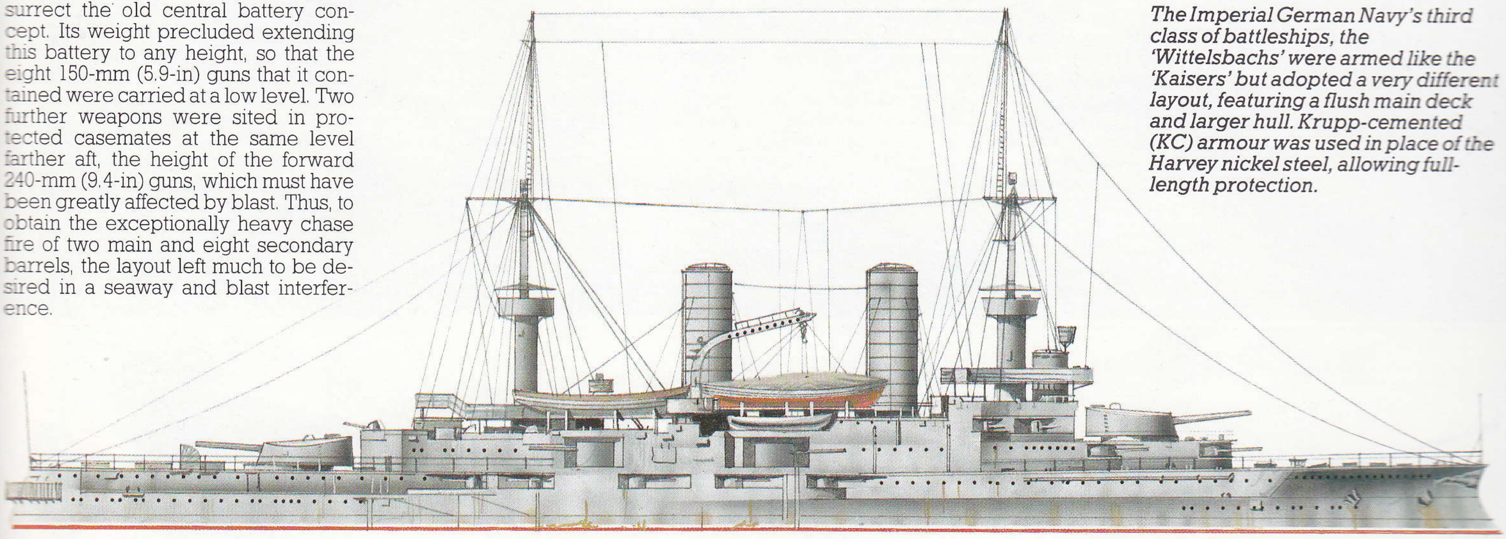


'Wittelsbach' class battleships in line ahead, seen from the Zeppelin L.54. They were mobilized in 1914 to form the 4th Battle Squadron but soon left the fleet as they were too vulnerable to stand in the line of battle. After the war, all were scraped save* Zahringen*, which survived until 1944.

German battleships of this period were still aimed primarily at North Sea and Baltic operations, their dimensions and draught being limited to suit tidal restrictions and sizes of locks to basins and the Kiel Canal. The class was too old to play any significant role in World War I and all survived it. For a period between the wars the *Zahringen* operated as a radio-controlled target ship.

Specification

'Wittelsbach' class
Displacement: 11,775 tons standard and 12,790 tons full load
Dimensions: length 126.8 m (416.0 ft); beam 22.8 m (74.8 ft); draught 8.0 m (26.2 ft)
Propulsion: three sets of triple-expansion steam engines delivering 11185 kW (15,000 ihp) to three shafts
Speed: 18 kts
Armament: two twin 240-mm (9.4-in), 18 150-mm (5.9-in) and 12 88-mm (3.46-in) guns, and four 450-mm (17.7-in) torpedo tubes
Protection: belt 225-100 m (8.86-3.94-in); protective deck 75 mm (2.95 in); barbettes 250 mm (9.84 in); secondary guns 150 mm (5.9 in)
Complement: 688



The Imperial German Navy's third class of battleships, the 'Wittelsbachs' were armed like the 'Kaisers' but adopted a very different layout, featuring a flush main deck and larger hull. Krupp-cemented (KC) armour was used in place of the Harvey nickel steel, allowing full-length protection.

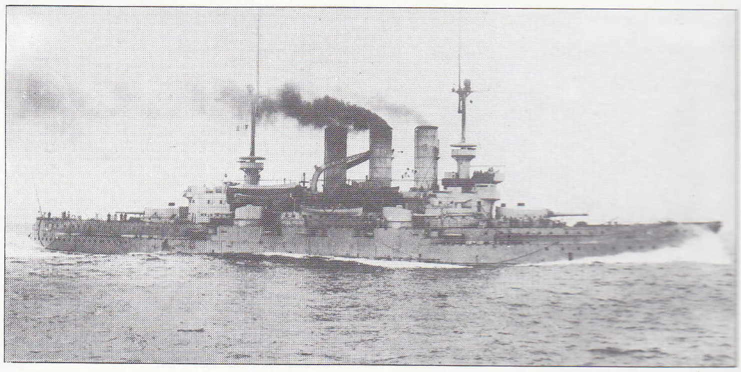
GERMANY

'Braunschweig' class

Tirpitz's First Navy Bill of 1898 had provided for the basis of a German fleet headed by 19 battleships by 1904. The UK, though not directly threatened, took notice. It was the Second Navy Bill of 1900, that started the naval race, calling as it did for 38 capital ships with an extension eventually to 48. Germany intended now to be a colonial power and would need to challenge the British to do it; her ships, therefore, began to change in character.

The five 'Wittelsbachs' had been essentially 'home waters' ships, accepting a small-calibre main battery as a necessary consequence of an acceptable rate of fire. At the battle ranges then considered normal, the 240-mm (9.4-in) guns could, in any case, penetrate the belts of any likely opponent. British ideas were already, however, moving toward increasing ranges, which would have rendered the German guns ineffective. The latter, therefore, urgently improved the rate of fire of the 280-mm (11-in) gun and increased the size of the second class, the five **'Braunschweig' class** battleships, to accommodate such guns. The dimensions and displacement were to the maxima compatible with the Wilhelmshaven locks and the Kiel (Nordsee-Ostsee) Canal. The ships, launched between 1902 and 1904, were SMS ***Braunschweig, Elsass, Hessen, Lothringen*** and ***Preussen***.

Secondary armament was also upgraded, from the preferred 150-mm (5.9-in) gun to an unusual 170-mm (6.7-in) type, with a loss of four barrels. As the hull was able to accept a greater area of armour, the secondary weapons were better grouped amidships, though the majority were in a main deck battery that was still too low to be fought properly in a seaway. The primary reason for this upgrading was the growing need to stop torpedo craft at ranges that were rapidly increasing with the improved technology of the torpedo. To achieve the same 18-kt speed as the earlier class, installed power had to be increased by about 15 per cent, though the endurance of about 6300 km (3,915 miles) at 16 kts was only a marginal improvement. Boilers were divided between six cylindrical and eight Thornycroft-Schulz water tube types, a combination that required three funnels. Up to 1,600 tons of coal and 200 tons of oil fuel could be carried.



Preussen*, seen here in 1910, was the fourth of the 'Braunschweig' class, which began construction after Tirpitz's Second Navy Bill (1900) and the beginning of the Anglo-German naval race which was to do so much to bring about World War I.*

Specification

'Braunschweig' class
Displacement: 12,990 tons standard
Dimensions: length 127.6 m (486 ft); beam 22.5 m (73.8 ft); draught 7.45 m (24.4 ft)
Propulsion: three sets of triple-expansion steam engines delivering 1252 kW (16,800 ihp) to three shafts
Speed: 18.5 kts
Armament: two twin 280-mm (11-in), 14 170-mm (6.7-in) and 12 88-mm (3.46-in) guns, and six 450-mm (17.7-in) torpedo tubes
Protection: belt 225-100 mm (8.86-3.94 in); transverse bulkheads 150 mm (5.9 in); protective deck 75 mm (2.95 in); barbettes 250 mm (9.84 in); casemates 150 mm (5.9 in)
Complement: 660

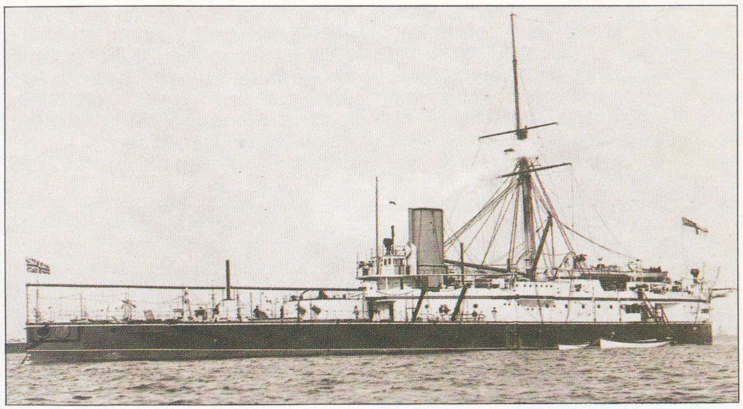
Guns and Armour

From the launch of the first ironclad to the eclipse of the battleship as the final arbiter of war at sea, warship design was dominated by the struggle between guns and armour. Guns steadily grew in range and power, but engineers continued to devise new types of armour plate to defeat them.

As a term, 'pre-Dreadnought' dates of course from the completion of HMS *Dreadnought* herself and thus invariably bears overtones of obsolescence. In their day, however, such vessels were the best capital ships afloat, but what is often uncertain is the precise definition of that day.

From the transitional types of capital ship in the 1860s, where steam-driven hulls still retained a broadside armament and full rig, development took off in a variety of directions, with a literal trial of strength emerging between the gun and armour plate. As massive protection kept out heavy projectiles, larger guns had to be carried but there had to be fewer of them. Properly arranged, these occupied less space and, therefore, demanded a smaller area of protection which, in turn, could be thicker. Such arrangements rapidly took the gun from its traditional carriage to pivot mountings, which could be trained through one of several embrasures, and then to the powered barbette, where the weapons were sited on a revolving turntable, firing over and protected by, a fixed and heavy circular redoubt. While the latter allowed guns to be trained rapidly through wide arcs, they were of little use if obstructed by a full set of rigging. So until machinery was reliable enought to make the 'mastless' warship acceptable, central battery ships were popular, built around armoured boxes extending often through two decks and projecting beyond the sides to maximize axial fire. This latter feature was important as powered opponents could either flee or possibly work themselves into a decisive raking position.

Adequate protection was so heavy that when the 'mastless' turret ship became a reality, its freeboard was exceedingly low. While this kept the belt area to a minimum, it gave a poor stability range and seakeeping was rapidly degraded by a deteriorating sea state. Attempts to increase freeboard resulted immediately in greater areas of thinner armour and the heavy guns sited so high that they had to be mounted in barbettes rather than turrets. Thus mounted, both guns and crews were vulnerable to fragments, though heavy projectiles were still fired at such close ranges that their trajectories were flat, armour being concentrated into heavy vertical belts to defeat them.

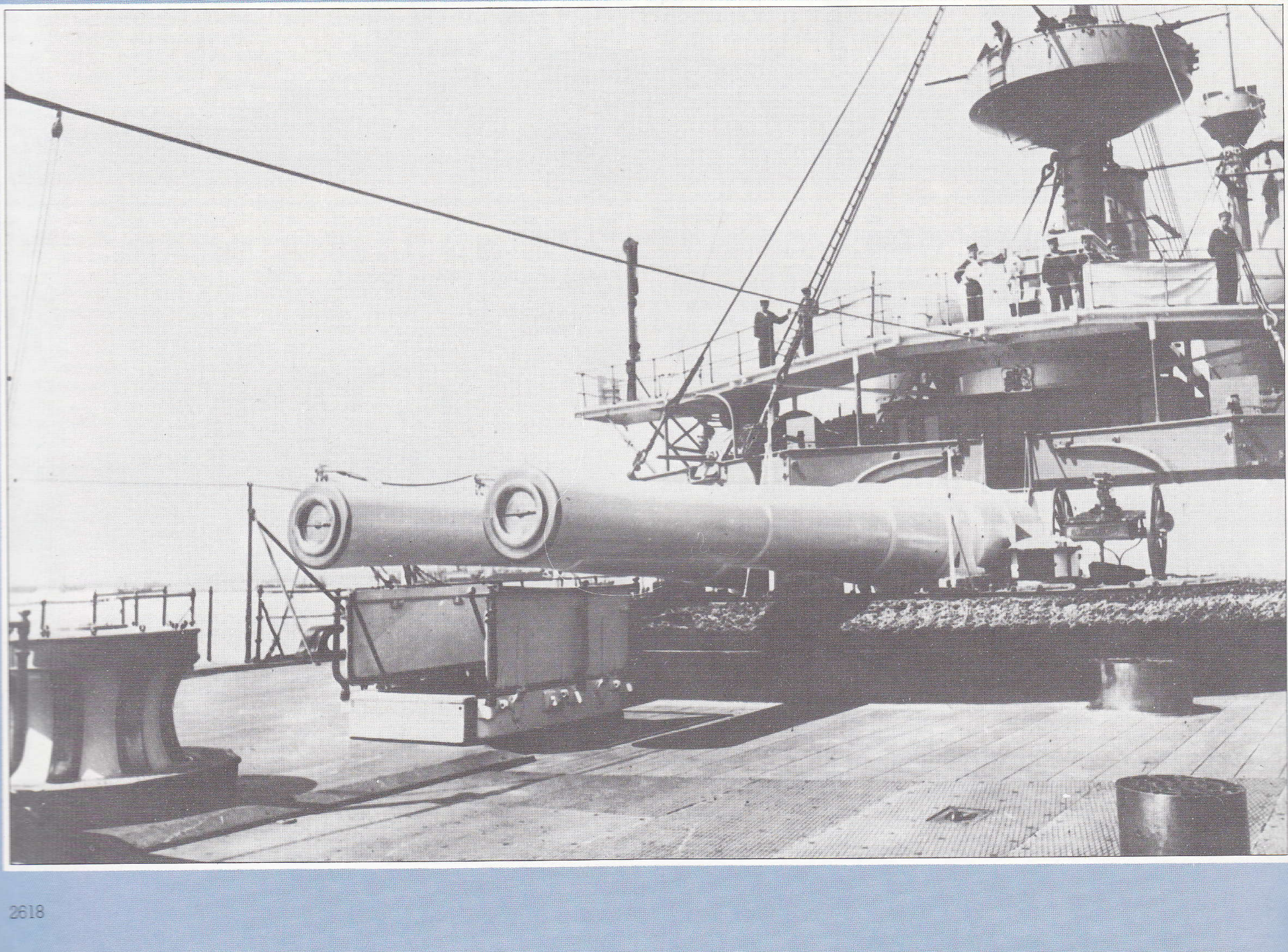


HMS Conqueror, *launched in 1881, was a product of a misinterpretation of the battle of Lissa in 1866 which seemed to demonstrate that the ram was an effective means of sinking ironclad battleships.* Conqueror's *armament was concentrated forward to support the ramming attack.*

Early armour was of wrought iron, usually sandwiched with teak and proprietory compounds to improve resilience and to resist fragmentation. This phase lasted approximately from 1860 to 1880, by which time it was possible to find two 305-mm (12-in) layers of wrought iron, secured back-to-back. With new guns soon able to pierce even this, however, the next move was to steel armour which, while showing greater resistance to penetration, was liable to shatter under the smashing effect of large shot.

From 1880 to 1890, therefore, compound armour evolved. This was iron, faced with harder steel, which was either poured molten or hot-rolled to produce a composite slab which, itself, could be rolled further. While this combined the projectile-shattering quality of steel with the toughness of iron, the hard face did

A close-up of the open barbette mounting of the 13.5-in guns of HMS Royal Sovereign. *Able to fire one round every 2½ minutes, which could penetrate nine inches of KC plate at 5,000 yards, they were the most effective guns of their day. Later British battleships reverted to higher-velocity 12-in guns.*



tend to peel from its substrate when impacted, while improved types of chilled and capped armour-piercing shot again soon proved compound armour's equal.

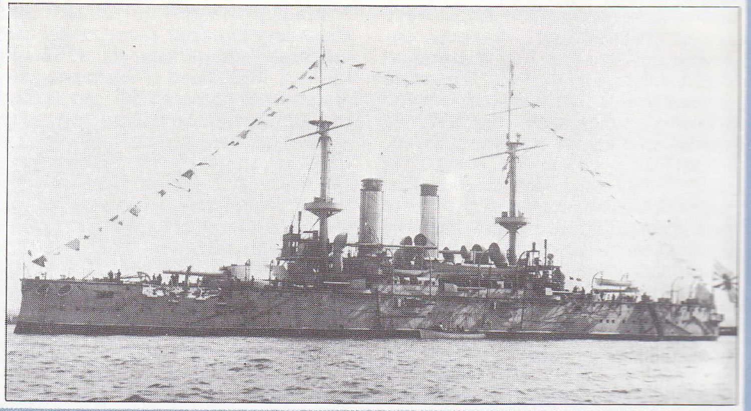
The decade from 1890 to 1900 was that of the metallurgist. First, Harvey 'carbonised' the face of nickel steel plate, quenching it and annealing it to produce a very hard surface. While a great step forward, such armour had the tendency to spall on the inside when struck, a deficiency rectified by Krupp who reinstated toughness by the addition of chrome. The resultant 'Krupp Cement', or KC, plate became the new standard. Compared with wrought iron KC could offer the same level of protection at only 40 per cent of the weight, so freeboards could be significantly increased with small effect on vulnerability.

The big gun, meanwhile, kept pace. Up to the 1880s, large calibres were shipped for their 'smashing' capabilities rather than superior range. Belts and supporting structures were to be shattered at close quarters, with medium calibre guns simultaneously riving the softer superstructure, starting fires and maintaining a rapid rate of fire to demoralize the other ship's crew.

To engineers, however, it was readily apparent that, while the energy of a projectile is directly proportional to its mass, it is also proportional to its velocity squared. In short, increases in muzzle velocity were of far greater import than increases in calibre, which had the attendant penalties of greater weight and slower rates of fire.

Several factors combined to capitalize on this relationship. In about 1890 cordite replaced black powder as a propellant. In place of a near explosive detonation on firing, which was inefficient and put enormous stresses into the gun chamber, the slower-burning cordite released rapidly-expanding gases that smoothly accelerated a projectile along the barrel. Far higher muzzle velocities were possible, but only with longer barrels which did not 'droop'. Cast weapons thus gave way to a construction with concentrically shrunk tubes, and this in turn to the greatly superior wire-wound variety. The length of the latter could be accepted only because a reliable breech mechanism was produced finally to displace muzzle-loading. Hydraulic power was applied to handling, loading and training to increase firing rates.

Thus, in the early 1890s, the standard 305-mm (12-in) British naval gun was increased from 35 to 40 calibres in length, muzzle velocity rising from 640 m (2,100 ft) to 792 m (2,600 ft) per second. Better penetrating power and longer range were coupled with more consistent ballistics and a much-reduced smoke nuisance. Rather than smash an opponent in a risky close-range brawl, it was now possible to destroy him scientifically from beyond the range of his secondary battery. This possibility resulted immediately in the beginning of fire control, the provision of heavier horizontal and oblique armour to defeat the plunging shell, and an increase in secondary armament calibres.

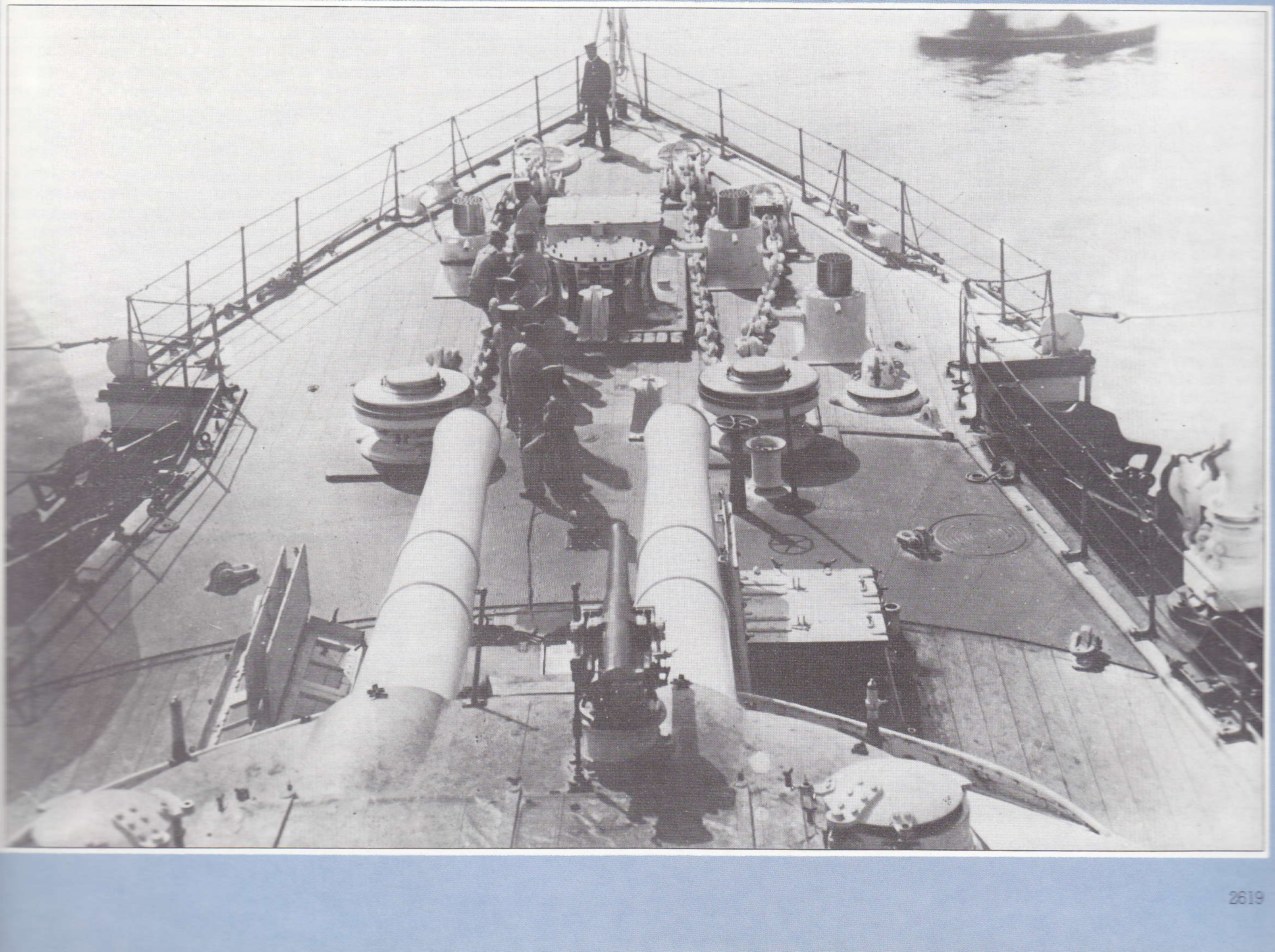


Fuji *was the first battleship ordered from Britain by the young Japanese navy. An improved 'Royal Sovereign' design, she shipped 12-in 40-calibre guns which, because of their higher muzzle velocity, were more effective weapons than the 13.5-in guns of the British vessels.*

A sequence of fundamental improvements thus came together in the early 1890s to produce a new strain of capital ship, seakindly yet capable of both inflicting and receiving punishment. In a period of British naval pre-eminence, the Royal Navy led the way with HMS *Majestic* of 1895 and, by the time that the next fleet, that of the Russians, completed its first in 1902, had commissioned a further 17 and built four more for the client, Japan.

The 'pre-Dreadnought' as a type was supreme for just a decade. By the time that the Americans (1902), the Germans (1904), the Italians (1904) and the French (1906) followed suit, they were barely in time to be eclipsed by the next and greater revolution, the introduction of the Dreadnought battleship itself.

The forecastle of HMS Majestic *at the turn of the century, a period when paintwork and polish seemed more important to some Royal Navy officers than gunnery and manoeuvre. Her 12-in guns fired 850-lb shells which could penetrate 11½ in of KC armour at 5,000 yards.*



USA

'Kearsage' class

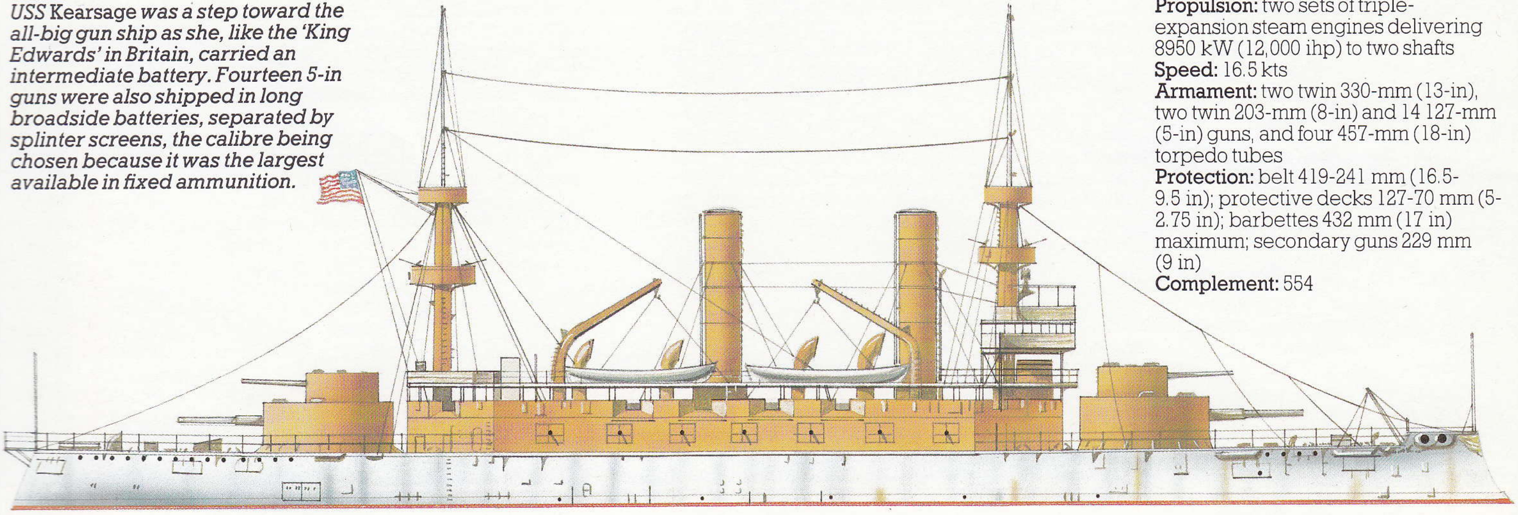
Early American battleships were aimed primarily only at coastal defence, but the 1898 US war against Spain was rapidly successful because of naval power. By virtue of the war and following annexations, the USA acquired the Philippine Islands, Hawaii, Wake Island, Puerto Rico and part of Samoa. Anti-imperialist consciences proved elastic enough to accept these new responsibilities and to expand the fleet to a level that would not only safeguard the new territories but would, eventually, be second only to that of the UK.

Limited size and draught, coupled with a heavy armament of 330- and 203-mm (13- and 8-in) primary and secondary batteries respectively, put the three 'Indiana' class ships (BB-1 to BB-3) of 1893 ahead of European contemporaries on paper but, practically, resulted in great limitations as a result of low freeboard and blast effects. The USS *Iowa* (BB-4) of 1896 aimed to rectify this with a higher freeboard for better seakeeping, saving weight on the more elevated turrets by accepting a cut in calibre to 305 mm (12 in), the European norm. This back-tracking was not at all in favour with the new navy, which limited the class to one ship and opted for the innovative but extraordinary pair of **'Kearsage' class** ships (BB-5 and BB-6) as follow-ons. Launched in 1898, these were the USS ***Kearsage and*** **Kentucky**.

Although the *Iowa* had suffered a reduction in main battery calibre, she had retained a heavy secondary armament of eight 203-mm (8-in) guns set sensibly but weightily in twin turrets. The 'Kearsages' reverted to the 330-mm (13-in) gun at the cost of four of the 203-mm (8-in) weapons but, to save weight further in the quest for freeboard, the remaining four 203-mm (8-in) weapons were paired on the top of the main turrets in houses rigidly fixed to the lower element. Thus the two batteries had to be trained together on a common roller path. Fourteen 127-mm (5-in) guns (the largest calibre that could use 'fixed' QF ammunition) were shipped in two long broadside batteries, the guns separated by splinter screens. Speed was sacrificed for wide beam (for steadiness) and heavy protection, the cofferdams backing the belt (419 mm/16.5 in thick amidships) being filled with 'compressed American corn pith cellulose' to limit flooding following damage.

Specification
'Kearsage' class
Displacement: 11,540 tons standard
Dimensions: length 114.4 m (375.25 ft); beam 22.0 m (72.25 ft); draught 7.2 m (23.5 ft)
Propulsion: two sets of triple-expansion steam engines delivering 8950 kW (12,000 ihp) to two shafts
Speed: 16.5 kts
Armament: two twin 330-mm (13-in), two twin 203-mm (8-in) and 14 127-mm (5-in) guns, and four 457-mm (18-in) torpedo tubes
Protection: belt 419-241 mm (16.5-9.5 in); protective decks 127-70 mm (5-2.75 in); barbettes 432 mm (17 in) maximum; secondary guns 229 mm (9 in)
Complement: 554

USS Kearsage *was a step toward the all-big gun ship as she, like the 'King Edwards' in Britain, carried an intermediate battery. Fourteen 5-in guns were also shipped in long broadside batteries, separated by splinter screens, the calibre being chosen because it was the largest available in fixed ammunition.*



USA

'Mississippi' class

The US Navy has always firmly believed in the virtues of acquiring the largest affordable ships; the current (1986) arguments regarding future aircraft-carriers and attack submarines demonstrate a continuing conviction. The argument is a powerful one as the designer has freedom to make his ship more battleworthy in terms of armament, speed and protection, while the larger ship can better keep the seas.

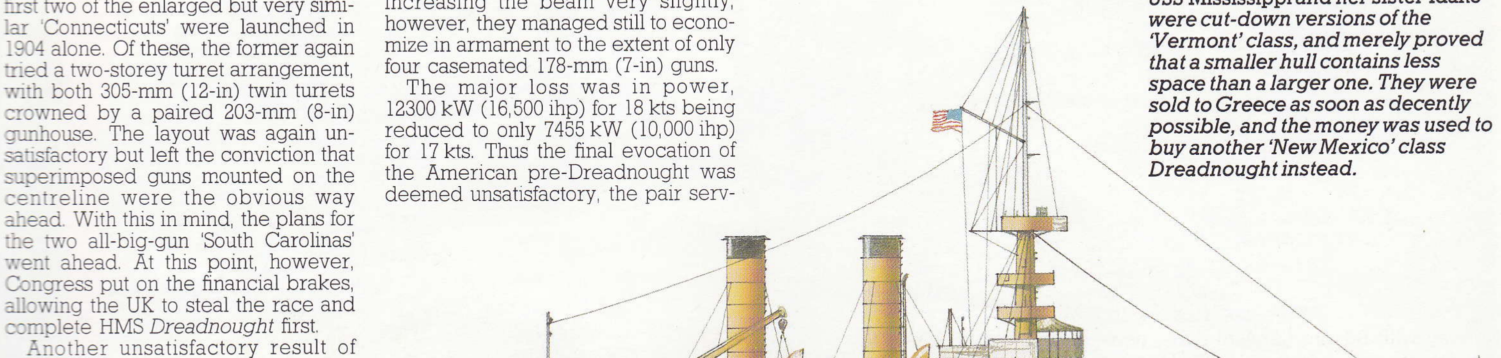
As the US Navy moved toward the inception of the Dreadnought era it had a very heavy building programme. Six 15,000-ton 'Virginias' and the first two of the enlarged but very similar 'Connecticuts' were launched in 1904 alone. Of these, the former again tried a two-storey turret arrangement, with both 305-mm (12-in) twin turrets crowned by a paired 203-mm (8-in) gunhouse. The layout was again unsatisfactory but left the conviction that superimposed guns mounted on the centreline were the obvious way ahead. With this in mind, the plans for the two all-big-gun 'South Carolinas' went ahead. At this point, however, Congress put on the financial brakes, allowing the UK to steal the race and complete HMS *Dreadnought* first.

Another unsatisfactory result of these economies was the pair of **'Mississipi' class** diminutives built in the middle of the 'Connecticut' series, which ran from the USS *Connecticut* (BB-18) herself to the USS *New Hampshire* (BB-25), the standard 139.1-m (456.3-ft) hull permitting a powerful three-tier armament of four 305-mm (12-in) guns, eight 203-mm (8-in) guns in paired turrets and 12 178-mm (7-in) guns in casemates. In 1905, however, Cramp of Philadelphia launched the USS ***Mississippi*** (BB-23) and USS ***Idaho*** (BB-24) 'economy versions' cut down to 116.4 m (382 ft). By actually increasing the beam very slightly, however, they managed still to economize in armament to the extent of only four casemated 178-mm (7-in) guns.

The major loss was in power, 12300 kW (16,500 ihp) for 18 kts being reduced to only 7455 kW (10,000 ihp) for 17 kts. Thus the final evocation of the American pre-Dreadnought was deemed unsatisfactory, the pair serving only six years before being sold to the Greeks. Renamed ***Lemnos*** and ***Kilkis***, they must have strained the facilities of the Greek navy to the utmost, but *Kilkis* lasted to be sunk in 1941 in a different war.

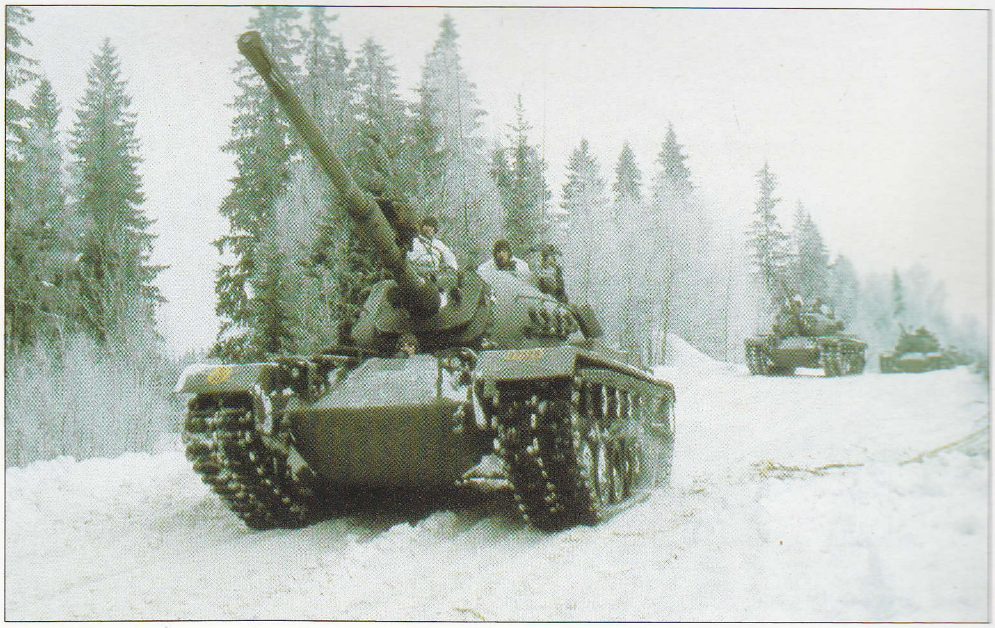
Specification
'Mississippi' class
Displacement: 13,000 tons standard
Dimensions: length 116.4 m (382.0 ft); beam 23.5 m (77.0 ft); draught 7.6 m (25.0 ft)
Propulsion: two sets of triple-expansion steam engines delivering 7455 kW (10,000 ihp) to two shafts
Speed: 17 kts
Armament: two twin 305-mm (12-in), four twin 203-mm (8-in), eight 178-mm (7-in) and 12 76-mm (3-in) guns, and two 533-mm (21-in) torpedo tubes
Protection: belt 229-102 mm (9-4 in); transverse bulkheads 178 mm (7 in); splinter deck with 64-mm (2.5-in) slopes; barbettes 305 mm (12 in); casemates 152 mm (6 in)
Complement: 800

USS Mississippi *and her sister* Idaho *were cut-down versions of the 'Vermont' class, and merely proved that a smaller hull contains less space than a larger one. They were sold to Greece as soon as decently possible, and the money was used to buy another 'New Mexico' class Dreadnought instead.*



Norway

Norway shares a common border with the USSR, but in comparison with this giant has a population of only just over 4 million. Norway has been a member of the North Atlantic Treaty Organization for many years, but does not allow the permanent basing of NATO forces, apart from command staff, in its country in peace. The NATO Allied Mobile Force trains in Norway on a regular basis and in time of war would deploy on the flank of NATO where there was the greater threat. Some NATO countries, including the USA, are now stockpiling equipment in Norway to save time transporting it by air or sea in time of war.



M48A5s make up a quarter of the tank strength of the Royal Norwegian army. Obvious differences from the earlier models of M48 include the fitting of a 105-mm (4.13-in) main gun, distinguishable from the 90-mm (3.54-in) weapon of the earlier vehicles by the absence of a prominent muzzle brake.

The Army

The Norwegian army has a peacetime strength of 19,500 officers and men, of whom about 12,000 are conscripts doing 15 months national service. Reserves on full mobilization total 165,000 officers and men who would form 12 brigades each with about 5,000 men, two armoured squadrons, support and other units. There are also 72,000 officers and men in the home guard, which can be mobilized in just four hours. Each man normally does 50 weekend hours or six consecutive training days per year. Norway is divided into Northern and Southern Commands, the former having its HQ in Bodo and the latter its HQ in Oslo.

In peacetime the Norwegian army is organized into one light brigade group for northern Norway, comprising three infantry battalions, one tank company and a self-propelled artillery battalion, one anti-aircraft battery and two border garrison battalions.

In southern Norway there is an all-arms group comprising one infantry battalion, one light tank company, one self-propelled artillery battalion and one anti-aircraft battery. In addition there are independent armoured squadrons, infantry battalions and artillery regiments.

Infantry weapons in service include 9-mm (0.35-in) Walther P1 and Browning M1911 pistols, 9-mm MP40 sub-machine guns left behind by the Germans, the 7.62-mm (0.3-in) West German Heckler & Koch G3 rifle built under licence in Norway by Kongsberg Vapenfabrikk, the 7.62-mm Rheinmetall G3 and the American 12.7-mm (0.5-in) M2HB machine-guns, and the British 81-mm (3.2-in) L16 and American 107-mm (4.2-in) M30 mortars. Anti-aircraft weapons include the Swedish RBS-70 surface-to-air missile system and the 20-mm (0.78) FK 20-2 which is a West German Rheinmetall 20-mm cannon on a mount designed and built in Norway. Anti-tank weapons include the American Hughes TOW ATGW, the older French SS.11, the 66-mm (2.59-in) M72 LAW (built in Norway not only for the Norwegian army but other NATO armies), the 57-mm (2.24-in) M18, 75-mm (2.95-in) M20 and 106-mm (4.17-in) M40 recoilless rifles, and the Swedish 84-mm (3.3-in) Carl Gustav which can fire a variety of ammunition types.

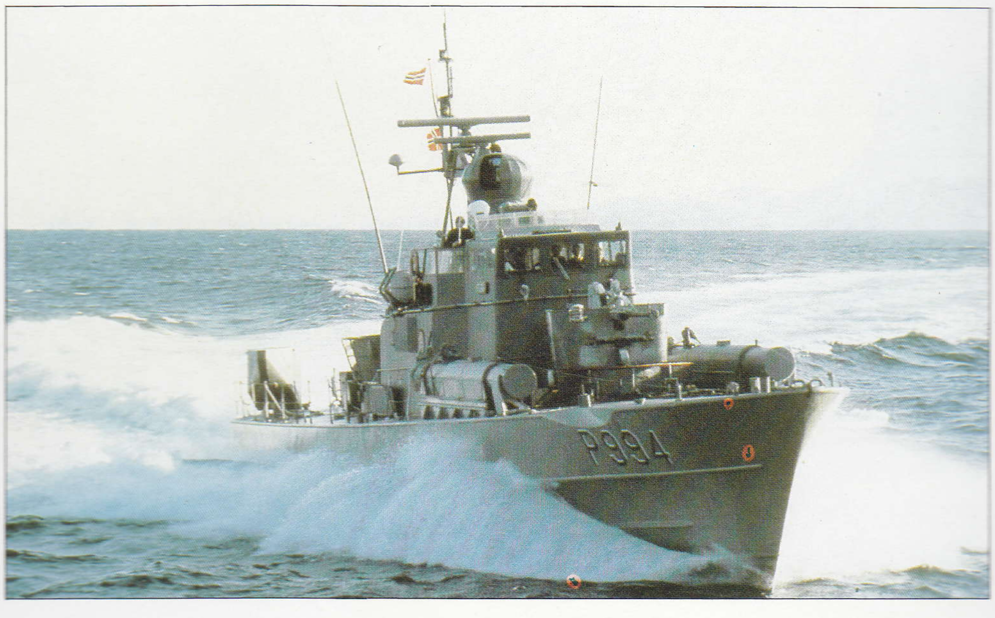
Armoured vehicles include 78 Leopard 1 MBTs with 105-mm (4.13-in) guns delivered between 1969 and 1971, six Leopard 1 ARVs, 30 M48A5 MBTs with 105-mm guns, 70 NM-116 light tanks (American M24 Chaffee vehicles modernized in Norway with 90-mm [3.54-in] guns, new engines and fire-control equipment), 150 M113 armoured personnel carriers including M557 command post vehicles, NM-135 fighting vehicles converted in Norway with turret-mounted 20-mm cannon and ATGW vehicles fitted with a turret designed and built in Norway to carry two TOW ATGWs in the ready-to-launch position. Artillery includes about 250 105-mm M101 and 155-mm (6.1-in) M114 towed howitzers, with the FH-70, FH-77B and French TR 155 now being considered as possible replacements. There are also about 40 M109 series 155-mm self-propelled howitzers. In addition to the RBS-70 surface-to-air missile systems there are also 20-mm and 40-mm (1.5-in) towed anti-aircraft guns. There are large numbers of Swedish Bv 202 and Bv 206 tracked all-terrain vehicles which have been designed specifically for operating in the snow. The Norwegian army also operates about 35 Cessna O-1E and Cessna L-18 light aircraft in the air observation post role.

The Navy

The Norwegian navy has a total strength of about 8,500 officers and men, of whom 5,500 are conscripts doing 15 months national service and about 1,500 in coastal defences. The main naval bases are Bergen, Harstad and Tromso. Naval reserves total about 25,000 officers and men with a number of the craft below manned only in time of war or for training.

The fleet includes 14 'Type 207' class submarines built in West Germany and commissioned between 1965 and 1967; these have eight 533-mm (21-in) torpedo tubes with Norwegian command and control system, Norwegian torpedo fire-control system and West German sonars and torpedoes. In 1983

***Stegg** is one of 14 'Hauk' class Fast Attack Craft commissioned between 1977 and 1980. Displacing 155 tons at full load, they are armed with six Penguin Mk 2 SSMs in single launchers, one 40-mm (1.57-in) and one 20-mm (0.78-in) gun, and carry two 533-mm (21-in) torpedo tubes.*



Oslo is the nameship of the five-strong class of frigates built in the mid-1960s with US assistance. The design is based on that of the 'Dealey' class destroyer escorts of the US Navy, but is substantially modified for Norwegian service.

West Germany and Norway signed an agreement under which Thyssen Nordseewerke would build six 'Type 210' submarines between 1989 and 1994 with an option on a further two. The five 'Oslo' class frigates built in Norway were commissioned in 1966-7; these are based on the American 'Dealey' class of destroyer escorts but modified to suit Norwegian requirements, and now have Norwegian Penguin surface-to-surface missiles, Sea Sparrow SAMs, four 76-mm (3-in) guns, Mk 32 ASW torpedo tubes and the Norwegian Terne ASW system. Half the cost of construction of these ships was met by the USA. There are also two 'Sleipner' class corvettes commissioned in 1965-7 and armed with a 76-mm gun and a 40-mm Bofors anti-aircraft gun as well as ASW weapons.

The main bulk of the Norwegian navy is made up of light forces which can be easily hidden and are well suited to operations in the fjords around Norway. All of these have been designed and built in Norway, and many have the Norwegian Penguin anti-ship surface-to-surface missile. There are 14 'Hauk' class fast attack craft (missile) commissioned between 1977 and 1980 and armed with six Penguin SSMs, one 40-mm Bofors gun and one 20-mm Oerlikon gun; 19 'Storm' class craft commissioned between 1965 and 1968 which have six launchers for Penguin SSMs, one 76-mm and one 40-mm Bofors gun; six 'Snogg' class fast attack craft (missile) with four 533-mm (2.09-in) torpedo tubes, four Penguin SSM launchers and one 40-mm Bofors gun; and eight 'Tjeld' class fast attack craft (torpedo) commissioned in the early 1960s and armed with one 40-mm Bofors, one 20-mm cannon and four 533-mm torpedo tubes. These 'Tjeld' class craft are held in reserve.

Other vessels include three coastal patrol craft, two coastal minelayers (each of which can carry and lay 300 to 400 mines), one controlled minelayer, and 10 coastal minesweepers, all commissioned in the mid-1950s and due to be replaced by a new class of eight mine countermeasures vessels.

UH-1B helicopters land troops during a recent exercise. Although Norway does not allow permanent stationing of NATO forces in the country, the NATO Allied Mobile Force trains there every year. In a conflict with the USSR, Norway would be of great strategic importance to both sides.

Support craft include seven tank landing craft, one depot ship for both submarines and fast attack craft, seven coastal transports, two diving tenders, one torpedo recovery vessel, and the usual research ships and tugs.

Coastal Defences

These come under the control of the Norwegian navy and include 15 coastal defence fortresses which are to be rebuilt with at least 50 artillery, mine and torpedo batteries. Guns used at present include 75-mm (2.95-in), 105-mm, 120-mm (4.7-in), 127-mm (5-in), and 150-mm (5.9-in) weapons, many of which were emplaced by the Germans during World War II. Bofors of Sweden is now installing new 120-mm Ersta guns in armoured cupolas, and these can fire 25 rounds per minute.

The Coast Guard

This was founded in 1977 but operational control is held by the Norwegian Defence Command. Vessels include seven chartered vessels with a 40-mm gun and a displacement of between 500 and 1,200 tons, and three specially built 'Nordkapp' class (out of seven originally intended to be built) which each have a Lynx helicopter, one 57-mm (2.24-in) Bofors gun and four single 20-mm cannon. There are also three other patrol craft each with a 40-mm Bofors gun. The six Lynx Mk 86 helicopters are operated by the Norwegian air force's No. 337 squadron.

The Air Force

The Norwegian air force has been undergoing extensive modernization in recent years with the older Lockheed F-104G/CF-104 fighters being phased out of service and replaced by 72 General Dynamics F-16s (comprising F-16A single-seaters and 12 F-16B two-seaters). Total personnel strength of the Norwegian air force is about 9,500 officers and men, of whom 5,000 are conscripts doing 15 months national service. Air force reserves total about 25,000 officers and men, and include many airfield defence battalions armed with Bofors 40-mm L/60 anti-aircraft guns. The Norwegian air force is integrated into the NATO air defence system and Royal Air Force fighters often land in Norway to refuel after shadowing Soviet aircraft over the North Sea.

The front-line strength now consists of four squadrons with a total of 72 General Dynamics F-16s: Nos 331 and 334 Squadrons are based at Bodo, and Nos 332 and 336 squadron are based at Rygge. One operational conversion unit with 35 Northrop F-5A fighters, one maritime patrol squadron (No. 333) with seven Lockheed P-3B Orion aircraft, one transport squadron with six Lockheed C-130H transport aircraft and three Dassault-Breguet Falcon 20s, one transport squadron with four de Havilland Canada DHC-6s and two Bell UH-1B helicopters, one search and rescue squadron (No. 330) with 10 Westland Sea King Mk 43 helicopters, two utility squadrons with 26 UH-1Bs (Nos 719 and 720) and 21 Saab-Scania Safari training aircraft complete the inventory. Missiles include the Sidewinder air-to-air missile and the Bullpup surface-to-surface missile. On order is an air-launched version of the Penguin